No. 6.—*The American Caecilians*[1]

By Emmett Reid Dunn

An interest in American Caecilians, begun in 1920 when I found a few specimens of Gymnopis in Costa Rica, was enhanced when I took a specimen of a new species in western Panamá in 1923. In 1928 I attempted, rather unsuccessfully, to list the North American forms. In Europe in 1929, as a holder of a John Simon Guggenheim Memorial Fellowship, I took the opportunity to examine the American Caecilians in the collection of the British Museum of Natural History and in the principal museums of the continent. Since my return I have examined practically all the material in the United States, in Panamá, and in Costa Rica, and have been sent extensive collections by the Instituto La Salle in Bogotá, by the Museu Paulista in São Paulo, and by the Museu Nacional in Rio de Janeiro.

Systematic treatment of American Caecilians since 1895 has been based almost entirely upon the work of Boulenger and upon the collections of the British Museum. This institution contained, in 1929, 103 American Caecilians (28 species, 6 genera, and the types of 15 described forms). While it is the best single collection, it is far from complete.

My present treatment is based on the examination of 850 American Caecilians (44 species, 6 genera, the types of 39 described forms, and the types of nine forms thought to be new). I have not been able to examine the types of 14 described forms. I consider one of these valid and can place it in its genus. I suspect that another may be valid but as I cannot place it in any known genus it must remain *incerta sedis*. I therefore recognize 6 genera, and 44 species, of which I have seen specimens of all but one species.

genus	specimens	types seen	types not seen	species
Rhinatrema	19	3 + 2 new	1	6
Gymnopis	157	11	2	11
Siphonops	253	4	5	5
Caecilia	324	15 + 7 new	2	16
Chthonerpeton	39	2	1	3
Typhlonectes	58	4	2	3
	850	39 + 9 new	13	44

The type of *Siphonops syntremus* Cope is another I have not been able to examine, but I cannot place it in any known American genus or species.

[1] Contributions from the Biology Department, Haverford College, No. 8.

Distribution

American Caecilians range from latitude 20 north (Vera Cruz and Guerrero in Mexico) to latitude 35 south (Buenos Aires, Argentina) on the Atlantic side, and to latitude 3 south (Guayaquil, Ecuador) on the Pacific side. They range from sea level to 4500 feet (Cartago, Costa Rica) and to 6200 feet (Milligalli, Ecuador).

They occur on the following islands: Saboga and San Miguel in the Gulf of Panamá; Gorgona off the Pacific coast of Colombia; Trinidad; Victoria and São Sebastião off the coast of São Paulo, Brazil.

Mexico to Costa Rica inclusive have only the genus Gymnopis. Bolivia and Paraguay have only Siphonops. Argentina and Uruguay have only Chthonerpeton. Panamá has Gymnopis and Caecilia. Colombia has 5 genera and 18 species; Ecuador, 4 genera and 11 species; Peru, 4 genera and 8 species; the Guianas, 5 genera and 8 species; Brazil, 4 genera and 13 species.

Gymnopis and Siphonops form a pair of allied genera, the former northern, the latter southern. Typhlonectes and Chthonerpeton form another such pair of genera, the former northern, the latter southern.

Rhinatrema and Caecilia occupy the center of the group range, northwestern South America, which is also the area of greatest abundance of genera and species.

There would seem to be a minor center of development in the south (Chthonerpeton and Siphonops) and perhaps another in Central America (Gymnopis).

It may be inferred from the distribution that Caecilians have inhabited South America since preTertiary times, and that they have only entered North America since the midTertiary. Only two genera reach Panamá, only one reaches Costa Rica, and the northern limit is 15 degrees of latitude short of the southern limit.

Generic assignments and affinities

A primitive Caecilian should, theoretically, have the following characteristics:

1. A definite tail.
2. Secondaries all complete and equal in number to the primaries.
3. Two complete rings of scales to each segment, one for the primary and one for the secondary.
4. Inner mandibular tooth row well developed.
5. Teeth of any given row uniform in size.

6. Tentacular aperture close to eye.
7. Eye well developed and in an open orbit.
8. Body approximately cylindrical, short and fairly stout, without dorsal fin.
9. Anus not surrounded by a sucking disk.
10. Oviparous.
11. Aquatic larvae, gill slit open.
12. Jaw muscles not roofed by bony contact between parietal and squamosal.
13. Skull with more rather than fewer separate bones.

The specimens here assigned to the genus Rhinatrema agree in all respects with the above criteria. Specimens assigned to other genera differ more or less, and are presumably less primitive.

Specimens assigned to the genus Gymnopis have no tail; the secondaries are less in number than the primaries and are not all complete; scales are absent anteriorly; the inner mandibular tooth row is poorly developed or absent; the tentacular aperture may be some distance anterior to the eye; the eye is, in some species, invisible, and the orbit is sometimes roofed over by bone; they are viviparous and have no aquatic larval stage.

Specimens assigned to the genus Siphonops agree on the whole with Gymnopis but lack secondaries and scales completely; the animals are oviparous; but there is not known to be an aquatic larval stage. These are all the differences I can find between such species as *Gymnopis mexicanus* and *Siphonops annulatus*. A common ancestor for these two genera may be inferred to have existed, with the secondaries and scales of Gymnopis and the breeding habits of Siphonops, and thus closer to Rhinatrema than either of the two.

The species assigned to Chthonerpeton have no tail; they lack secondaries and scales entirely; the tentacular aperture is always some distance anterior to the eye and may be just behind the nostril; the anus is surrounded by a sucking disk; the animals are viviparous and the embryos have a single pair of large allantoic gills; it may be inferred that an aquatic larval stage is absent.

The species assigned to Typhlonectes agree on the whole with Chthonerpeton, but the tentacular aperture is always just behind the nostril; the body is flattened laterally, with a dorsal fin. These are all the differences I can find between such species as *Chthonerpeton indistinctum* and *Typhlonectes compressicauda*. Chthonerpeton may be inferred to be ancestral to Typhlonectes.

These two genera agree with Rhinatrema in having a well developed inner mandibular tooth row.

The species assigned to Caecilia have no tail; the secondaries are reduced in number and sometimes entirely absent; scalation is reduced or entirely absent; the inner mandibular tooth row is reduced or absent; the tentacular aperture is remote from the eye, being under the tip of the snout, below and somewhat posterior to the nostril; the eye may be invisible and the orbit roofed by bone; the body may be excessively attenuated; the animals may be inferred to be oviparous, with an aquatic larval stage.

There are thus the following groups of genera in America: Rhinatrema; Gymnopis and its ally Siphonops; Chthonerpeton and its derivative Typhlonectes; Caecilia. Of these four groups, Rhinatrema occupies an isolated and a primitive position. The other three exhibit characters which preclude any linear arrangements of them. It is not impossible that each has been derived independently from a more primitive common ancestor. There is nothing known to prevent this common ancestor from having the characters of Rhinatrema.

The species here assigned to Caecilia have been listed as three genera; Amphiumophis, Herpele, and Caecilia. The unique type specimen of *Amphiumophis* is a *Caecilia tentaculata*. The only differentiating character given for the genus was the absence of the inner mandibular tooth row, which is poorly developed in some Caecilia. The roofed orbit and invisible eye of *C. ochrocephala* and *C. polyzona* have caused their reference to Herpele, but the eye is frequently invisible in other species of Caecilia, and *ochrocephala* and *polyzona* are so similar to the other forms of Caecilia that I cannot but regard them as congeneric.

The species here assigned to Gymnopis are usually listed as two genera; Gymnopis and Dermophis. The only difference given is the roofed orbit and invisible eye of Gymnopis. The variability and uncertainty of this condition in *Gymnopis multiplicata oaxacae* and in *Gymnopis nicefori* make a generic division of the species impractical.

I gather from the literature that four genera and six species occur in Southeast Asia; one genus with six species in the Seychelles Islands; six genera and 17 species in tropical Africa.

The degree of affinity between Rhinatrema and the genera Ichthyophis and Uraeotyphlus of southeastern Asia remains to be determined. Statements in literature would seem to indicate a fairly close relationship.

Parker (1941, Ann. Mag. Nat. Hist. (11), 7 pp. 1-17), has shown

that African and Seychelles Islands forms, formerly referred to Dermophis [=Gymnopis of this paper] are not congeneric with American species.

The African *Herpele squalostoma*, the type of Herpele, is not congeneric with any American form, although two have been referred to Herpele from time to time. The American forms in question are Caecilia. Whether or not the Indian "*Herpele*" *fulleri* is congeneric with either remains to be determined.

As matters stand it is not safe to consider that any genus of American Caecilians has representatives in the Old World, or, indeed, that any genus of Caecilians occurs in more than one of the four areas (southeast Asia, Seychelles Islands, African tropics, American tropics) inhabited by these animals.

The eye

Normally and primitively the eye is in an open orbit and visible through the skin. At the opposite extreme the orbit may be closed over by bone, and the eye may be invisible. In some forms the orbit may be open but the eye may be concealed by the thickness or the opacity of the skin. It is also possible that the eye may remain visible externally even after the orbit is roofed by bone. In many forms, known only from a few rare or unique specimens which it is not possible to dissect, the exact condition of the eye is not yet known. It is therefore often impossible to say more than that the eye is or is not visible externally.

It is so visible in all Rhinatrema, Chthonerpeton, and Typhlonectes, and the orbit is not known to be roofed over in any of these.

In Siphonops the orbit is not known to be roofed over in any form, but the eye is invisible externally in half the *S. insulanus* seen. Of 21 *S. brasiliensis* seen the eye is very indistinct in one and invisible in four.

In Gymnopis the eye is invisible externally in all *unicolor, oligozona* and *multiplicata multiplicata* seen. The orbit is known to be roofed by bone in some specimens of *unicolor* and *multiplicata multiplicata*. In *nicefori* the eye is invisible in 4 specimens out of 6. In one of these four the orbit is not roofed by bone. In *multiplicata proxima* the eye is visible externally in a single specimen (of 38 examined), and in this one the orbit is open. The eye is visible in 13 out of 15 *multiplicata oaxacae*, but the condition of the orbit is not known. In other forms of Gymnopis the eye is always visible and the orbit is not known to be roofed over.

In Caecilia the eye is invisible externally in all known specimens of *ochrocephala*, *polyzona*, and *elongata*. The orbit is known to be roofed over in some *ochrocephala*. In the following species the eye is occasionally invisible externally; *gracilis*, one of 31; *dunni*, one of 19; *thompsoni*, one of 9; *tentaculata*, three of 26; *bassleri*, three of twelve. The orbit was open in the specimen of *gracilis*.

The eye is always visible in the other forms of Caecilia, and the orbit is not known to be roofed over in any of them.

Cranial characters

I have examined specimens of *Rhinatrema bi-color*, *Gymnopis mexicanus mexicanus* (2), *Gymnopis unicolor*, *Siphonops annulatus*, *Siphonops brasiliensis*, *Caecilia ochrocephala*, *Chthonerpeton indistinctum*, *Typhlonectes compressicauda natans*, *Typhlonectes kaupii*.

The cranial characters confirm the position of Rhinatrema as primitive; the alliance between Gymnopis and Siphonops; the alliance between Chthonerpeton and Typhlonectes.

Rhinatrema bicolor has the premaxillae separate from the nasals. In the other genera the premaxilla and nasal are fused. *Rhinatrema bicolor* has a large flat bone posterior to the combined maxilla-palatine. What is obviously the same bone (but smaller) can be found in Gymnopis and in Siphonops. No such bone exists in Caecilia, Chthonerpeton, or Typhlonectes. This bone has the relationships of an ectopterygoid more than that of a pterygoid. In the literature it has gone by both names. I think that some Caecilians have an ectopterygoid, thus differing from all other living Amphibians, and that no Caecilians have a pterygoid. There has been much confusion in literature, because a forward extension of the quadrate (coössified in cartilage) has been called a "pterygoid bone" by many investigators.

In Rhinatrema, in Gymnopis, and in Siphonops the internal naris is enclosed by the maxilla-palatine. In Caecilia, Chthonerpeton, and Typhlonectes the internal naris is enclosed on the outer side by the maxilla-palatine and on the inner by the prevomer.

The frontals are in contact in Rhinatrema, in Gymnopis, in Chthonerpeton, and in Typhlonectes. They are separated by the "ethmoid" in Siphonops and in Caecilia. The former condition would seem primitive.

In Rhinatrema, in Chthonerpeton, and in Typhlonectes there is a wide gap between the squamosal and the parietal, and the temporal muscles are not covered by bone. In Gymnopis, Siphonops, and

Caecilia squamosal and parietal are in contact, and the temporal muscles are roofed by bone. The former condition would appear to be primitive.

The three genera with a gap between squamosal and parietal have markedly "kinetic" skulls, with considerable movement between the "maxillary segment" and the "occipital segment." They are "monimostylic" as the quadrate is firmly attached to the squamosal. The three genera without a gap between squamosal and parietal have much less movement between the segments of the skull, and are less "kinetic" but are just as much "monimostylic." The former condition would appear to be primitive.

On these characters, Rhinatrema is alone. Its skull characters, as well as its other characters, seem to me to be primitive.

Gymnopis differs in skull characters from Siphonops only in having the frontals in contact, in which trait as in its other characters it seems to me to be more primitive.

Chthonerpeton and Typhlonectes agree in all significant cranial characters.

Caecilia stands alone, and is the most specialized of the genera in cranial characters.

The cranial characters of American Caecilians align them in relation to each other in the same way and the same order as do their other characters.

While I am quite aware of previous remarks on the cranial characters of American Caecilians, and aware that the above remarks disagree with some of them, I offer no apologies. The statements given above result from examination of all the American genera at the same time, and consequent comparison of one with another. All the statements are from my own observations and none are from any other sources.

The tentacle

Statements in the literature give the impression that the tentacle of American Caecilians is present in two quite different conditions: a valvular or flap-shaped tentacle, in a horseshoe-shaped groove or aperture, attached posteriorly to the skin of the head; a globular tentacle in a circular aperture or groove. This is erroneous, as all American Caecilians have a quite similar tentacle and aperture, all of the first type. In American Caecilians the second type is an occasional consequence of unusual retraction of the organ, and careful observation will disclose the posterior attachment. This occurs more often in

specimens of Gymnopis. The two appearances may be present on opposite sides of the same individual. The tentacular aperture is the posterior end of the naso-lachrymal duct.

The anatomical base of the tentacle is, in all forms, the anterior border of the eye socket, and this is also the place of origin of the organ embryologically. It may therefore be inferred that the original position of the aperture was on the side of the head, just anterior to the eye. This is the position in all Rhinatrema and in most forms of Gymnopis and Siphonops. In the races of *G. mexicanus*, in *G. albiceps* and in *G. parviceps* the aperture is further forward, but nearer the eye than the nostril. In a single specimen of *G. m. mexicanus* (of 66 examined) the aperture is exactly equidistant between nostril and eye. In 8 specimens of *Siphonops annulatus* (of 175 examined) the aperture is further forward, in one nearer the nostril than the eye.

In Chthonerpeton the aperture is, in *viviparum*, slightly nearer the eye than the nostril; in *indistinctum* it is slightly nearer the nostril than the eye; in *petersi* and in all forms of Typhlonectes it is directly behind the nostril.

In all forms of Caecilia the aperture is on the under side of the snout, below and slightly posterior to the nostril.

The vent

The vent is an unmodified opening except in Chthonerpeton and in Typhlonectes, where the area surrounding it becomes modified into a sucking disk. Every stage in this transition may be seen in the three species of Chthonerpeton. The disk is slightly developed in *C. viviparum*, intermediate in *C. petersi*, and large in *C. indistinctum* and in all Typhlonectes.

Sex

American Caecilians have no external signs by which they may be sexed. Males have a median intromittent organ, which is occasionally extruded, perhaps during the death throes. Pregnant females of viviparous species are quite stout, and may have the hinder portion of the body enlarged. It is usually necessary to dissect in order to determine the sex. No variation in number of segments, of secondaries, or of scale rings has so far been found correlated with sex.

Annular grooves

In all American Caecilians the muscle segmentation is marked externally by grooves, the "*primaries*." These correspond in position to the ends of ribs and therefore to vertebrae. A count of them gives the number of vertebrae. They are precisely identical to the "costal grooves" of salamanders. They may extend completely around the body, but are frequently incomplete dorsally and, less often, ventrally.

In American Caecilians the number of these primary grooves ranges from 76 (in *Chthonerpeton indistinctum*) to 285 (in *Caecilia bassleri*). The range 76–166 covers all specimens of Gymnopis, Siphonops, Chthonerpeton, and Typhlonectes. Rhinatrema has 108–198 primaries, and Caecilia has 110–285.

Individual variation is, of course, greater in forms with a high count. No age variation appears or is to be expected. No sexual variation has been discovered.

In Rhinatrema, in Gymnopis, and in most Caecilia, some or all of the segments are partly or completely divided by *secondary* grooves in the middle of the segment. In Rhinatrema these are present and complete in each segment, and it is impossible, without dissection, to distinguish between primary and secondary grooves. In this genus the number of vertebrae equals half the number of superficial rings. In Gymnopis and in Caecilia the secondaries are absent from the more anterior segments. In these two genera the secondary rings appear at first anteriorly as two unconnected grooves, between the primaries, and parallel to them, in the dorsolateral area. The first appearance is often asymetrical. They increase in length in the more posterior segments, the two join first dorsally, and then, towards the posterior end, ventrally. At the hind end they are exactly like the primaries, but as they rapidly become incomplete anteriorly on the under side it is not hard to make a separate count of the two sets. It is extremely important in these two genera to keep the primary and secondary counts separate.

These secondary grooves are an outward and visible sign of the presence of bony scales in the anterior half of the segment. The secondary counts given in this paper are all taken by beginning with the *first* incomplete (dorso-lateral) secondary groove to appear, and counting *all* the segments posterior to it.

Secondary grooves are present in all species of Rhinatrema (equal in number to the primaries and all complete); all species of Gymnopis (from a minimum of 10 anterior segments without them in *G. multi-*

plicata oaxacae to a maximum of 87 in *G. nicefori;* a maximum count of 121 in *G. multiplicata oaxacae,* a minimum of 13 in *G. parviceps;* anterior secondaries always incomplete, maximum complete 67 in *G. nicefori*); most species of Caecilia (from a minimum of 55 anterior segments without them in *C. dunni* to a maximum of 268 in *C. bassleri;* a maximum count of 94 in *C. armata;* anterior secondaries always incomplete, maximum complete 26 in *C. dunni*).

Secondary grooves are present or absent in two species of Caecilia (*C. guntheri*, 8–0); *C. pachynema*, 11–0).

Secondary grooves are unknown in three species of Caecilia (*C. caribea, C. degenerata, C. elongata*) in all species of Siphonops, of Chthonerpeton, and of Typhlonectes.

The individual variation in number of secondaries, and in number of complete secondaries, shows no correlation with age or sex.

Scalation

Bony cycloid scales are concealed beneath the skin anterior to both primary and secondary grooves in all Rhinatrema, all Gymnopis, and in most Caecilia. They are absent in all Siphonops, in all Chthonerpeton, and in all Typhlonectes. They invariably accompany secondary grooves. In Gymnopis and in Caecilia the first secondary conceals a single scale. A complete secondary conceals a complete ring of scales. Wherever secondaries are present there are scales present anterior to the primaries. They appear first in the dorsolateral area and extend further dorsally and ventrally as one passes back along the body. At the hind end each segment contains two complete rings of bony scales. In Rhinatrema, every segment of the body contains two complete rings of scales.

In some (but not in all) specimens of Caecilia without secondaries scales may be found in connection with the hindmost primaries. Ordinarily, lack of secondaries indicates lack of scales; presence of secondaries *always* indicates presence of scales.

Nieden (1913, Gymnophiona, p. 2) says: "scales . . . are in most genera restricted to the back (only Ichthyophis and Herpele have scales on the belly also) and are besides arranged in many rows in the hinder half only of each of the epidermal folds limited by two circular grooves." As may be seen from the foregoing remarks, none of the statements made by Nieden are correct. Scales are on the belly in Rhinatrema, Gymnopis, and Caecilia; there are never more than two rows or rings to a segment; they are usually in both halves of a segment.

The statement about "many rows" is obviously reached by examination of microscopic sections, as the scales of any one ring overlap each other considerably. There is *no* overlapping of the scales of one ring by those of another. My statements concerning scalation are derived from examining the scales *in situ* on the animals.

Dentition

American Caecilians bear teeth on the premaxillary and maxillary bones as an outer, upper row; on the prevomers and palatines as an inner, upper row; on the dentaries as an outer, lower row. An inner, lower row, sometimes present, has been considered splenial.

At one extreme of American variation the teeth are all similar, and relatively numerous in all rows. It is legitimate to infer that this is the primitive condition.

At the other extreme the teeth of the premaxilla-maxilla set and of the dentary set are progressively enlarged anteriorly into big hooked fangs, and are reduced in number. The inner mandibular row may be entirely absent. This condition is probably secondary.

The species of Rhinatrema, Chthonerpeton, and Typhlonectes have the presumably primitive condition, and no generic distinctions in dentition have been observed.

In Gymnopis and in Siphonops the teeth on the lower jaw are uniform but larger than those on the upper. The inner mandibular row is reduced to one tooth on a side (in *oligozona* and in *multiplicata*) or is entirely absent.

In Caecilia the anterior teeth on the lower jaw are much enlarged and sharply pointed; to a less degree this is true of the maxillary teeth. The inner mandibular row may consist of as many as four teeth on a side (five or six were reported for the types of *polyzona*); they may be reduced to one on a side or may be entirely absent.

Accurate counts of the number of teeth in any given row are well nigh impossible to make unless the specimen is stained and cleared, or unless it is made into a skull. Either of these two operations enables one to count the teeth *and* the sockets, and thus arrive at an accurate statement of the total dentition. Such treatment is obviously impossible for most of the specimens. I am profoundly skeptical of dental characters in these animals as a basis for specific discrimination, having found considerable variation in count between the two sides of the same individual in skulls and in cleared specimens.

The presence of enlarged, sharply pointed, anterior teeth in all

American Caecilians with the tentacular aperture under the nostril (and only in these) tends to establish the genus Caecilia as here treated.

The great reduction or absence of the inner mandibular row in the species here considered Gymnopis and Siphonops (in connection with other characters) confirms their alliance.

Chthonerpeton viviparum (with 3–4 teeth in the inner mandibular row), and *Siphonops brasiliensis* (with none), are otherwise so similar that they have been confused. Aside from this I know of no case where it is necessary to examine dentition in order to arrive at specific or generic identification, and it is not absolutely necessary even in this case.

Dimensions

The smallest individual seen is a specimen of *Gymnopis nicefori* 100 mm. long. Perfectly formed young 76 mm. long have been taken from the oviduct of a pregnant *Gymnopis parviceps*. The smallest species are: *Siphonops hardyi* (nine specimens with a maximum length of 178 mm.) and *Gymnopis parviceps* (a single pregnant female 180 mm. long).

Eleven species (5 Rhinatrema, 2 Siphonops, 4 Gymnopis) have their maximum recorded lengths under 251 mm. The maximum length recorded outside the genus Caecilia is 695 mm. Six species of Caecilia exceed this length, and three (*tentaculata* 1075 mm., *abitaguae* 1200, *thompsoni* 1375) exceed a meter. The maximum length attained by Caecilians in the Old World is 500 mm.

A diameter of 30 mm. is attained by *Gymnopis m. mexicana*, by *Caecilia tentaculata*, and by *Typhlonectes compressicauda natans*.

If Caecilians were represented in collections only by specimens ideally collected and preserved, accurate measurements of length and of diameter could be taken with little difficulty, and the ratio of length to diameter would be very reliable. Actually, specimens have to be measured in every conceivable state of preservation and distortion. There is wide discrepancy in the length measurement of a number of specimens as taken by different observers, it is impossible to avoid a possible error of as much as a millimeter in diameter measurements, and 1/d ratios presented here are in no case carried into decimals, and in most cases give a range of variation which exceeds that of the animals in life.

Stout species are often slimmer when young and vice versa. Many seem to retain the same proportions throughout life.

A small *Typhlonectes c. compressicaudus* has an 1/d ratio of 12, and a pregnant female *Gymnopis m. mexicanus* one of 14. No Rhinatrema seen has an 1/d ratio of over 30. Outside of Caecilia the slimmest specimen seen is a *Gymnopis nicefori* with a ratio of 67. Seven species of Caecilia may be more attenuate than this, and *Caecilia bassleri* may be 160 times as long as wide.

The most elongate forms have the most vertebrae, but otherwise there is not too much correlation, and there is a wide range of vertebral count among equally stout forms.

The body is roughly cylindrical in most forms, and the diameter is the same from neck to vent. This statement is not true for Typhlonectes, which is compressed laterally, and has the posterior part of the body much deeper than the anterior. In this genus there is also a dermal dorsal fin fold, restricted to the posterior third in *compressicauda* and extending nearly to the head in *kaupii*.

In Rhinatrema there is a tail. In other genera the body ends bluntly just behind the vent.

Coloration

The majority of the forms have no definite markings, being dull blackish above, somewhat lighter below. The head is usually somewhat lighter than the dorsal surface, and the anal region is usually whitish.

The ventral surface is much lighter than the dorsal surface in some Gymnopis, and spotted or mottled with white in some Caecilia.

The primary grooves are white in two species of Siphonops (*annulatus* and *paulensis*), in marked contrast to the dark background of the segmental folds which they delimit. The reverse of this is seen in some Caecilia (principally *ochrocephala* and *polyzona*). In these the grooves are black and the folds are of a lighter color.

Yellow spots, one on each side on the segmental folds, are quite usual in *Caecilia pachynema*, and occur sporadically in a few other species of Caecilia.

Vivid yellow lateral stripes, one on each side, from jaw to vent, are present in three species of Rhinatrema (*bivitatum*, *parkeri*, and *bicolor*).

Habitat and habits

Something about the habitat may be inferred from the range given for a species. I have included the few ecological notes under the specific headings.

The climatic and botanic areas inhabited are: tropical rain forest; tropical deciduous forest; tropical savanna; temperate forest; temperate savanna. In North America the only temperate areas inhabited are montane cloud forest; it is probable that the animals occur in savanna only in galeria forest along rivers.

Except for the aquatic, river-dwelling Typhlonectes it is probable that all are terrestrial and burrowing. I have seen only three forms (*Gymnopis multiplicata proxima, Gymnopis parviceps,* and *Caecilia ochrocephala*) alive in the field, and the literature is singularly uninformative.

The animals are unquestionably carnivorous, but the precise aliment is not known.

Notes in literature indicate that they are preyed on by snakes; *Ninia atrata, Pseudoboa clelia, Sordellina brandonjoncsi,* and several species of Micrurus being mentioned.

Males have a median intromittent organ and fertilization is presumably internal.

Published observations would indicate that Rhinatrema and Siphonops are oviparous, and that Gymnopis, Chthonerpeton, and Typhlonectes are viviparous. The behavior of Caecilia is not positively known, but as no embryos have been found in females it is probably oviparous.

External gills have only once been reported for larvae (Rhinatrema. They have been reported for embryos in the eggs of Rhinatrema, and of Siphonops, and for embryos in the oviducts of Chthonerpeton and Typhlonectes. They have been reported absent in embryos in the oviducts of Gymnopis. In Rhinatrema these gills are in three pairs, the two anterior fimbriated, but with rather few filaments. The gills of Siphonops are similar but the posterior may be absent.

The gills of Chthonerpeton and of Typhlonectes are a single pair of large, flat, leaf-like structures. It is probable that these are entirely embryonic, and that the one case of birth with persistent gills was premature.

Free living (? aquatic) larvae without gills, but with a single pair of gill slits have been noted in Rhinatrema and in Caecilia. Well formed embryos in the oviducts of Gymnopis do not have gill slits. Normally born young of Typhlonectes lack gill slits, and gill slits were not reported for embryos of Chthonerpeton or of Typhlonectes, although external gills were present.

Gymnopis, Chthonerpeton, and Typhlonectes normally give birth to small replicas of the adult. Rhinatrema has a larval stage, which

is presumably aquatic, and which emerges from eggs laid by the mother. Siphonops lays eggs, but whether there is a larval stage is not known. Caecilia was reported long ago to have a larval stage. It is not certain that this is correct. It is not certain, but it is probable, that Caecilia lays eggs. It is peculiar that less is known of the breeding habits of Caecilia than of the other five genera, since specimens of Caecilia make up nearly 40% of those in collections.

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I have seen a specimen from the Museo Nacional of Salvador.

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No single museum has anything like a complete set of the forms of American Caecilians (6 genera, 44 forms). The three best are: British Museum (6 genera, 28 forms); American Museum (6 genera, 25 forms); Museum of Comparative Zoölogy (5 genera, 22 forms). These three collections together contain 38 forms, lacking only *Rhinatrema bivitatum, Rhinatrema colombianum, Siphonops insulanus, Caecilia subnigricans, Caecilia abitaguae,* and *Caecilia armata.*

Seven forms are not represented by specimens in any museum in this country (*Rhinatrema bivitatum, R. columbianum, R. parkeri, Siphonops insulanus, Caecilia güntheri, C. armata, Chthonerpeton petersi*).

Identification and methods

Measurements are given in millimeters. In Rhinatrema body length is from tip of snout to posterior end of anus; tail length is from latter point to tip of tail. In other genera only total length is given.

Primaries are counted first, then secondaries, then number of complete secondaries. It is sometimes easier, and just as accurate, to count the primaries down to the first secondary, and get the number of secondaries by subtracting this count from the total number of primaries. The foremost secondary is to be found in the dorso-lateral area, sometimes isolated from its successors. The primary and secondary counts must be kept separate.

The position of the tentacle should be noted.

Tentacle position, primary and secondary count, and 1/d ratio will ordinarily serve to identify any American Caecilian. It may sometimes be necessary to examine the dentition. In Caecilia attention should be paid to color and condition of eye and geographical probability.

The inner mandibular teeth, if present, are barely anterior to the edge of the tongue, the anterior teeth of the two rows close together. They are usually rather concealed in the gums, and their tips are on quite a different level from those in the outer mandibular row, so that it is not hard to overlook them.

Most descriptions of Caecilians in literature are much too long, repeating for the individual or for the species statements true of every member of the genus. This serves no useful purpose and may be confusing.

In cross-section the animals (except for the laterally compressed Typhlonectes) are circular when alive. Various preservatives and death throes may cause muscular contractions which materially alter this. Most prominent of these is contraction of the obliquus externus muscle, which makes a more or less marked dorso-lateral fold appear. This has fortunately not caused any difficulty in America, but one Old World form has been described as a new species on this basis, the fold being imagined to be "glandular".

The synonymies give, I hope, most of the papers with information on range, habits, relationships, and systematic treatment of each species. No attempt whatever has been made to include the multifarious references in anatomical papers to a few of the species, principally to *Siphonops annulatus*. Much of this material may be found in the bibliography given by the Sarasins (1890, Erg. nat. Forsch. Ceylon, 2, pts. 3–4) and in Werner's compilation (1931, in Kukenthal, Handb. Zool. 6, 2, pp. 143–208, ff. 231–338, bibliography). The latter work is extremely good and useful, but the systematic section extends only as far as genera, and is taken from Nieden (1913, Die Gymnophiona, section 37 of Das Tierreich), and Nieden's work, while the latest treatment of the Caecilians of the world, extending down to species, is compilation pure and simple.

Key to genera of American Caecilians

A. Secondaries as numerous as primaries; a tail (tentacle immediately anterior to eye; teeth uniform, inner row of mandibular teeth well developed) ..... Rhinatrema (p. 456)

AA. Secondaries (if present) not as numerous as primaries; no tail.

B. Tentacle under nostril, under tip of snout (anterior maxillary and outer mandibular teeth enlarged and pointed; inner mandibular row well developed to absent; secondaries from half as numerous as primaries to entirely absent; scales present or absent) ..... Caecilia (p. 494)

BB. Tentacle on side of head.

C. Secondaries present (teeth of a row uniform, maxillary teeth smaller than outer mandibular; inner mandibular row one tooth or absent; tentacle nearer eye than nostril) Gymnopis (p. 461)

CC. No secondaries (no scales).

D. No dorsal fin.

E. Tentacle nearer eye than nostril; no inner mandibular tooth row; primaries mostly complete; no anal disk Siphonops (p. 479)

EE. Tentacle usually nearer nostril than eye; inner mandibular tooth row well developed; primaries usually incomplete dorsally; an anal disk. . Chthonerpeton (p. 527)

DD. A dorsal fin (tentacle close to nostril; inner mandibular tooth row well developed; primaries incomplete dorsally; an anal disk) . . . . . Typhlonectes (p. 532)

This key may not serve to separate all specimens of Siphonops from Chthonerpeton (especially *S. brasiliensis* and *C. viviparum*). It would be advisable to consult the specific descriptions in the case of specimens from Southeastern Brazil.

"*Siphonops syntremus*" of Cope, from Northern Central America, was said to have: secondaries not so numerous as primaries; a tail; tentacle on side of head just posterior to nostril; mandibular teeth large and few. The unique type is lost. This combination of characters is otherwise unknown.

Rhinatrema Duméril and Bibron

1841. *Rhinatrema* Duméril and Bibron, Erpét. Gen. **8**, p. 288 (monotype *Caecilia bivitata* Cuvier).

1883. *Epicrionops* Boulenger, Ann. Mag. Nat. Hist. (5), **11**, p. 202 (monotype *E. bicolor* Boulenger).

Diagnosis. Caecilians with a distinct pointed and flattened tail; primaries 108–198 on body; secondaries as numerous as primaries, all complete; body and tail with two complete rings of bony scales in each segment; 1/d 20–30; tentacle in horseshoe-shaped groove, immediately anterior to eye and very small; eyes visible; teeth of any row uniform; inner mandibular tooth row well developed; length 145–370 mm.; six forms.

Range. Colombia, Ecuador and Peru. The Guianas. Sea level (?) to 3900 feet elevation.

Key to forms of Rhinatrema

A. Tail very short, much less than 5 mm. long; (striped; primaries 167–181; Guiana) ..... *bivitatum*
AA. Tail 8–20 mm. long; tail segments 5–25.
B. Primaries on body 198; striped; Colombia ..... *parkeri*
BB. Primaries on body 191; uniform; Guiana ..... *nigrum*
BBB. Primaries on body 140–175; uniform; Peru ... *peruvianum*
BBBB. Primaries on body 117–135; striped; Ecuador and Peru. *bicolor*
BBBBB. Primaries on body 108; uniform; Colombia .. *columbianum*

Remarks. I keep all these forms in the original genus Rhinatrema in spite of the fact that there is an obvious dichotomy between the type of Rhinatrema with scarcely any tail, and the other forms (including the type of Epicrionops) which have a well developed tail. Young specimens are difficult to count with accuracy, and sometimes seem to differ in color from adults (cf. uniform young from the type locality of *parkeri,* and uniform young from an area inhabited only by the striped *bicolor*). I have seen 19 specimens and know of three that I have not seen. I have examined the types of all the species with the exception of *columbianum.*

Rhinatrema bivitatum (Cuvier)

1829 *Caecilia bivitata* Cuvier, Regne Animal, (2), **2**, p. 100; Guérin-Méneville 1829–1838, Iconogr. Regne Animal, **3**, Rept., pl. 25, f. 2.
1831. *Caecilia bivittata* Gray, in Griffith's Cuvier's Animal Kingdom **9**, app., p. 110.
1841. *Rhinatrema bivittatum* Duméril and Bibron, Erpét, Gen. **8**, p. 288, pl. 85, f. 4; Duméril 1863, Mem. Soc. Cherbourg **9**, pl. 1, f. 5, 12; Vaillant 1895, CR. Acad. Sci. **120**, p. 460; Boulenger 1895, Proc. Zool. Soc. London, p. 407; Nieden 1913, Gymnophiona, p. 14.
1879 *Ichthyophis glutinosus* (part), Peters, Mon. Ak. Berlin, p. 928, 931, f. 2.

Type. Paris No. 8.
Type locality. Cayenne.
Range. French Guiana.
Diagnosis. A striped Rhinatrema, with tail at most 2 mm. long; primaries 167–181; 1/d 24–30; 195–300 mm. long.
Description. Nothing can be added to the diagnosis.
Remarks. This species was originally of rather uncertain locality,

and was confused with *Ichthyophis glutinosus* of southeastern Asia in the literature. The type is fortunately preserved and shows that this confusion was baseless. As the first known species of the most primitive American genus, the confusion with the most primitive Old World genus is not incomprehensible.

Specimens seen. 3 as follows:

		prim.	length	length of tail	diam.	1/d
Cayenne,	Paris 8	181	210		7	30
Guiana,	Paris 8a	167	195	2	8	24
São Paulo	Hamburg 5268	169	300		10	30

N.B. Quite likely São Paulo is an erroneous locality.

Rhinatrema parkeri spec. nov.

Type. BMNH 97–11–12, 23.

Type locality. Medellin, Colombia.

Range. Known only from type locality.

Diagnosis. A striped Rhinatrema with well developed tail (10 mm.); body primaries 198; 1/d 26.5; 212 mm. long.

Description. The type has two light stripes; 198 primaries on body and 12 on tail; total length 212 mm., tail 10 mm.; diameter 8 mm.

Remarks. The type has more body primaries than any other Rhinatrema examined, the nearest approaches being made by the striped *bivitatum* of Guiana (181) which has a very short tail; the uniform *nigrum* of Guiana (191); the uniform *peruvianum* of Peru (175). The other species known from Colombia, *columbianum* from the Province of Cauca, is uniform and has only 108 body primaries.

A larval Rhinatrema from Medellin, AMNH 1380, may possibly belong to this species. It is not in the best of condition and I cannot count its annuli. It is uniform black; has one gill slit but no external gills; length 162 mm., tail 10 mm.; diameter 8 mm.; 1/d 20.

I take great pleasure in naming this form after my friend H. W. Parker, of the British Museum of Natural History, to whom I am vastly indebted for help and advice, and to whom all herpetologists are indebted for his papers on Caecilians.

Specimens seen. Two, the type and one larva.

Rhinatrema nigrum spec. nov.

Type. AMNH (specimen mislaid, and number in my notes, 34088, either incorrect or duplicated).

Type locality. Arundabara, British Guiana, elevation 2200 feet.

Range. Known only from type locality.

Diagnosis. Uniformly dark; tail well developed (11 mm.); 191 body primaries; 1/d 23; length 211 mm.

Description. The type has, in addition to the diagnostic characters, 13 tail primaries; a diameter of 9 mm.

Remarks. This form differs from *parkeri* of Colombia, which has a similar segment count (198) in color; it differs from the other Guiana species, *bivitatum*, in color, in having a well developed tail, and in having ten more body segments; it differs from *peruvianum* in having sixteen more body segments.

Specimens seen. One, the type.

Rhinatrema peruvianum Boulenger

1902. *Rhinatrema peruvianum* Boulenger, Ann. Mag. Nat. Hist. (7), **10**, p. 153; Nieden 1913, Gymnophiona, p. 15; Noble 1927, Ann. New York Acad. Sci., p. 59, f. 5.

Type. BMNH 1902–5–29, 207.

Type locality. Marcapata Valley, southeastern Peru.

Range. Southeastern Peru.

Diagnosis. A uniformly colored Rhinatrema; tail 17–20 mm. long; primaries 140–175; 1/d 20–23; 280–370 mm. long.

Description. Uniform brown.

Specimens seen. 4, as follows:

Peru: Marcapata Valley	body prim.	tail prim.	body length	tail length	diam.	1/d
BMNH 1902–5–29, 207	175	14	280	917	12	23
"Juliaca," AMNH 1454	140	15	320	20	16	20
" AMNH 1457	—	—	65	6.5	3	19 embryo
No data, Vienna	152	—	370	20	17	21

Remarks. Noble (1927) has pointed out that this species is oviparous, and has figured an encapsuled embryo, with external gills.

The locality Juliaca is probably erroneous. Dr. Harvey Bassler has suggested that the specimens so labeled, sent by a member of the Inca Mining Co., came from the vicinity of the mine at Santo Domingo, north of the shipping station of Juliaca, and at about 3000 feet above sea level.

The embryo has branchial structures as described by Parker for *bicolor*. Its tail has a dorsal and a ventral finfold.

Rhinatrema bicolor (Boulenger)

1883. *Epicrionops bicolor* Boulenger, Ann. Mag. Nat. Hist. (5), **11**, p. 203.
1895. *Rhinatrema bicolor* Vaillant, C. R. Ac. Sci., **120**, p. 461; Boulenger 1895, Proc. Zool. Soc. London, p. 407, pl. 23, f. 2; Nieden 1913, Gymnophiona, p. 15; Parker 1934, Ann. Mag. Nat. Hist. (10), **14**, p. 265.

Type. BMNH 78–1–25, 110.

Type locality. Intac, Ecuador [3900 feet elevation in western Ecuador].

Range. Western Ecuador and the eastern part of Ecuador and of Peru.

Diagnosis. A striped Rhinatrema; with tail 8–15 mm. long; primaries 117–135; 1/d 16–27; 145–250 mm. long.

Description. The color of the La Merced specimens was a dark purplish brown; on each side a ventrolateral yellow band from jaw to vent.

Specimens seen; 9, as follows:

Ecuador:	body prim.	tail prim.	length	tail length	diam.	1/d
Intac: BMNH 78–1–25, 110	117	12	225	8	9	25
East Ecuador AMNH 46205	130	10	210	14	13	16
Peru:						
La Merced, Chanchamayo Valley, 3000–3500′						
AMNH 42858	135	25	241	15	9	27
" 42859	124	22	194	12	8	24
" 42860	124	19	250	14	10	25
" 42861	130	22	225	13	9	25
Chanchamayo or Perene						
AMNH 17304	118	12	220	13	10	22
" 17305	119	11	230	13	11	21
" 17306	128	12	—	—	—	—

Remarks. Parker (1934) has recorded a larva, probably of this species, from Zamora, Ecuador (3250 feet, east of the Andes). It had about 135 primaries, uniform body color, length 145 mm., tail 9.

"Three pairs of small external gills are persistent, the two anterior pairs fimbriated, with five or six finger-like processes, and the last reduced to a mere knob; ventral to this last is a single oblique slit-like gill-cleft equipped with a large valvular flap on each side and lying in a circular depression."

It would seem that this species occurs on both sides of the Andes. It is thus either able to cross the passes, some of which are fairly low in Ecuador, or, and more probably, it antedates the present elevation of these mountains.

Rhinatrema columbianum Rendahl and Vestergren

1938. *Rhinatrema columbianum* Rendahl and Vestergren, Arkiv f. zool. **31A**, **3**, p. 1, ff. 1–3.

Type. Stockholm 19, collected by Kjell von Sneidern.

Type locality. El Tambo, Prov. Cauca, Colombia, about 1000 m. elevation.

Range. Known only from type locality.

Diagnosis. A Rhinatrema without stripes; tail well developed (8.7 mm. long); primaries 108; 1/d 20.; total length 161 mm.

Description. "227 . . . skinfolds, of which 11 are on the tail"; 108 primaries and 108 secondaries on body; 5–6 primaries on tail; "greatest body diameter 20.1 times in total length; tail length 18.5 in total length"; black, uniform; anal region whitish; total length 161 mm. The tail length would appear to have been 8.7 mm.; the diameter to have been 8 mm.

Remarks. This is the shortest bodied member of the genus. The next shortest, *bicolor* of Ecuador and Peru, is striped and has 117–135 body primaries. The other Colombian species, *parkeri,* is striped, and is the longest bodied member of the genus, with 198 body primaries.

Gymnopis Peters

1874. *Gymnopis* Peters, Mon. Berlin Ak., p. 616 (monotype *Gymnopis multiplicata* Peters).

1879. *Dermophis* Peters, Mon. Berlin Ak., pp. 930, 937 (genus based on *Siphonops mexicanus* Duméril and Bibron and *Dermophis brevirostris* Peters. Four *species inquirenda* were also included. Noble designated *mexicanus* as type in 1924, in Bull, Amer. Mus. Nat. Hist. **49**, **11**, p. 305).

1883. *Cryptopsophis* Boulenger, Ann. Mag. Nat. Hist. (5), **12**, p. 166 (monotype *Cryptopsophis multiplicatus* Boulenger).

1924. *Gymnophis* Barbour, Proc. Biol. Soc. Washington **37**, p. 125 (*pro Gymnopis* Peters).

Diagnosis. Caecilians without a tail; primaries 95–158; secondaries 13–121; scales always present; 10–87 primary folds without secondaries; 1/d 14–67; tentacle in horseshoe-shaped groove on side of head between eye and nostril and nearer the former; few or no teeth in inner mandibular row; mandibular teeth larger than maxillary or palatine; teeth of a row uniform; eye visible or invisible, in orbit or under bone; length 100–510 mm.; eleven forms.

Range. Vera Cruz and Guerrero, Mexico, to western Panamá. Apparently absent from Yucatan Peninsula. Cauca and Magdalena Valleys, Colombia. Ecuador. French Guiana. Sea level to 4500 feet.

Key to forms of Gymnopis

A. North American species.
  B. Eye visible; tentacle slightly nearer eye than nostril; primaries 110 or less.
    C. Secondaries 32–80.
      D. 1/d 14–26.
        E. Secondaries 51–80 ..... *mexicana*
        EE. Secondaries 41 ..... *clarkii*
      DD. 1/d 25–32 ..... *gracilior*
    CC. Secondaries 13 ..... *parviceps*
  BB. Eye invisible (if visible tentacle extremely close to eye); primaries 112 or more.
    C. Secondaries 84–121.
      D. Eye usually visible; primaries 121–137, secondaries 101–121 ..... *oaxacae*
      DD. Eye invisible.
        E. Primaries 128–132 ..... *multiplicata*
        EE. Primaries 112–126 ..... *proxima*
    CC. Secondaries 62–74 ..... *oligozona*
AA. South American species.
  B. Eye visible; tentacle slightly nearer eye than nostril; primaries 124–125 ..... *albiceps*
  BB. Eye invisible (if visible tentacle extremely close to eye).
    C. Primaries 100–120 ..... *unicolor*
    CC. Primaries 133–15 ..... *nicefori*

A tabular list of counts of Gymnopis

Specimens seen	Form	Primaries	Secondaries	Primaries minus Secondaries	1/d
1	parviceps	96	13	83	22
4	gracilior	95–102	32–78	22–68	25–32
66	mexicana	97–110	51–80	26–59	14–26
4	clarkii	101–107	41	60–66	16–19
15	unicolor	100–120	22–74	41–87	27–40
38	proxima	112–126	84–104	15–36	23–34
2	albiceps	124–125	45–55	70–89	35–46
10	oaxacae	121–137	101–121	10–26	26–40
8	multiplicata	128–132	101–111	17–28	25–35
3	oligozona	128–135	62–74	57–68	44–64
6	nicefori	133–158	45–104	43–87	39–67
157					

Remarks. I have examined 157 specimens of this genus, including the types of eleven names. I have not examined the type of *Cryptopsophis multiplicatus* Boulenger 1883 in the British Museum (= *Gymnokis multiplicata proxima*) or the type of *Gymnopis multiplicata oaxacae* Mertens 1930 (Senck. Mus. 22130).

The generic name Cryptopsophis appears in the synonymy of Gymnopis because the type species and specimen is identical with an earlier described American form. The specimen was erroneously supposed to have come from the Seychelles Islands, and geography, rather than anatomy, seems to have prompted its description.

The generic name Dermophis appears in the synonymy of Gymnopis because the type species of Dermophis (*mexicanus*) appears to me to be congeneric with the type species of Gymnopis (*multiplicata*). Dermophis was characterized by having the eye visible, in an open orbit, whereas Gymnopis had the eye invisible and roofed over by bone. This difference exists as far as the two type species are concerned, but these two extremes are so bridged, in other forms, that generic distinction is impractical.

In general forms with visible eyes have the tentacular aperture slightly nearer the eye than the nostril. Forms with invisible eyes have the tentacular aperture very close to the eye and further from the nostril. Forms with visible eyes have, on the whole, no teeth in the

inner mandibular row; fewer primaries and secondaries; greater difference between primary and secondary count (= less of the body with bony scales). These criteria, which are not sufficiently clear cut to serve for dichotomy of the genus, indicate a vague division into two groups. One of these retains a well developed eye in an open orbit, but tends to a loss of scalation, a loss of the inner mandibular tooth row, and a more anterior position of the tentacular aperture. This group, containing *mexicana* and its races, *parviceps* and *albiceps*, is primitive in the retention of the eye, but presumably secondary in the other characters. The other group tends to reduction of the eye, but to retention of the inner mandibular tooth row, of the secondaries and scales, and of the posterior position of the tentacular aperture. This group contains *multiplicata* and its races, *oligozona*, *unicolor* and *nicefori*.

These two groups are more distinct in North America than they are in South America.

Specimens of *oaxacae* show the most complete scalation; specimens of *parviceps* show the most reduced scalation.

The "*Dermophis crassus*" of previous lists is, as appears from examination of the types, a straight synonym of *Siphonops annulatus*.

The difference in the present treatment of *mexicana* and of *multiplicata* and their races from that of Boulenger is a natural consequence of the examination of 157 specimens and 11 types by me, as against the examination of 13 specimens and 3 types by him.

Gymnopis multiplicata multiplicata Peters

1874. *Gymnopis multiplicata* Peters, Mon Ak. Berlin, p. 616, pl. 1, f. 1; 1879 Mon. Ak. Berlin, p. 939, f. 7; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 100; Cope 1885, Proc. Amer. Phil. Soc., **22**, p. 171; Boulenger 1895, Proc. Zool. Soc. London, p. 410; Günther 1902, Biol. Cent. Amer., Batr., p. 308; Nieden 1913, Gymnophiona, p. 21, f. 11; Dunn 1928 (in part), Proc. New England Zoöl. Club, **10**, p. 75.

1877. *Siphonops simus* Cope, Proc. Amer. Phil. Soc. **17**, p. 91; Brocchi 1883, Miss. Sci. Mex., p. 121.

1879. ?*Dermophis simus* Peters, Mon. Ak. Berlin, p. 938; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 99.

1885. *Gymnopis sima* Cope, Proc. Amer. Phil. Soc **22**, p. 171; 1887, Bull. U. S. Nat. Mus. 32, p. 9.

Type. Berlin No. 3705, collected by Warszewicz.

Type locality. Veragua.

Range. Pacific side, western Panamá and Costa Rica; Atlantic side, Honduras. Sea level to 4500 feet.

Diagnosis. A Gymnopis with invisible eyes; primaries 128–132; secondaries 101–111; difference 17–28; 1/d 25–35; length 358–510 mm.

Description. The few specimens seen afford no points other than those given in the diagnosis. The color is black, lighter below. Peters (1874) says there are 18 teeth on each side of the upper jaw.

Remarks. The species *Gymnopis multiplicata* may be divided into three races; *multiplicata* from the Pacific side, *proxima* from the Atlantic side, and *oaxacae* from Mexico. The differences are not great:

	prim.	sec.	diff.	
proxima	112–126	84–104	15–36	no eyes
oaxacae	121–137	101–121	10–26	eyes
multiplicata	128–132	101–111	17–28	no eyes

The criteria given above will serve to distinguish all *proxima* from the other two races, and almost all *oaxacae* from almost all *multiplicata*. The ranges are quite intelligible save for the single Honduras locality for *multiplicata*, which would seem to indicate that *proxima* holds territory between two areas of *multiplicata*. Specimens seen, eight, as follows:

	prim.	sec.	length	diam.	1/d
Honduras:					
Progreso Dist. MCZ 11048	131	104/10	365	12	30
Costa Rica:					
Tilaran USNM 70656	129	101/16	358	12	30
San Mateo USNM 37761	129	111/17	380	12	32
Cartago Coll. St. Luis Gonzaga	128	103	—	—	—
Taboga MNCR	—	———	—	—	—
No locality MNCR	128	111	370	11	34
" " USNM 29765	132	110/8	390	11	35 type *sima*
Panamá:					
Veragua Berlin 3705	131	105/9	510	20	25

Peters (1879) records it from Antioquia, Colombia, but it is very probable that this record was based on Berlin No. 9524 from Caceres, which is a specimen of *G. nicefori*.

Gymnopis multiplicata proxima (Cope)

1875. *Siphonops mexicanus* Cope, Journ. Acad. Nat. Sci. Philadelphia (2), **8**, p. 96.

1877. *Siphonops proximus* Cope, Proc. Amer. Phil. Soc **17**, p. 90; Brocchi 1883, Miss Sci. Mex., p. 121.

1879. *Dermophis ? proximus* Peters, Mon. Ak. Berlin, p. 938; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 99.

1883. *Cryptopsophis multiplicata* Boulenger, Ann. Mag. Nat. Hist. (5), **12**, p. 166 (Seychelles Is. *in errore*).

1885. *Gymnopis proxima* Cope, Proc. Amer. Phil. Soc. **22**, p. 171; 1887, Bull. U. S. Nat. Mus. **32**, p. 9; Boulenger 1895, Proc. Zool. Soc. London, p. 410; Günther 1902, Biol. Cent. Amer., p. 308; Nieden 1913, Gymnophiona, p. 21; Noble 1918, Bull. Amer. Mus. Nat. Hist. **38**, p. 346.

1928. *Gymnopis multiplicata* (part) Dunn, Proc. New England Zoöl. Club **10**, p. 75 (breeding habits); Parker 1936, Trans. Linn. Soc. London, 19, **4**, p. 455.

Type. USNM 29762–3, collected by Gabb.

Type locality. Eastern Costa Rica [= Limon].

Range. Nicaragua. Eastern Costa Rica, Prov. Bocas del Toro, Panamá. Sea level to 4500 feet.

Diagnosis. A Gymnopis with eyes usually invisible; primaries 112–126; secondaries 84–104; 15–36 primary folds without secondaries; 1/d 23–34; length 190–480 mm.

Description. Most specimens are distinctly lighter (even white) on the belly. The primaries are somewhat interrupted in the anterior dorsal region. ANS 4928, without locality, has the eye visible and not completely under bone. USNM 19614 has two inner mandibular teeth; the first scale appears on the side, under the primary, four segments anterior to the first secondary. The tentacle is much closer to the position of the eye than to the nostril.

Remarks. Specimens of my own collecting, from Guapiles, Monteverde and Suretka, Costa Rica; Farm Six near Almirante, Panamá; were under logs in damp pastures. One of the last was a pregnant female with one perfectly formed young in the oviduct. The embryo was 131 mm. long, 1/d 22., the mother was 375 mm. long, 1/d 25.

Specimens seen, 38, as follows:

	prim.	sec.	length	diam.	1/d
Panamá:					
Bocas del Toro USNM 38754	124	101/16	225	7	32
Coco Plum Estate, near Bocas MCZ 7990	119	97/10	365	12	30
Farm Six MCZ 9931	115	93/11	375	15	♀ 25
" " " 9932	116	85/9	250	11	23
Costa Rica:					
Suretka MCZ 9934	119	97/11	313	12	26
Limon USNM 29762	117	91/8	430	15	29
" " 29763	115	88/11	480	21	23
Salvadora Farm USNM 84241	116	92	—	—	—
Monteverde MCZ 7987	120	84/7	395	16	25
" " 7988	123	98/10	215	8	27
Reventazon USNM 38144	120	95/8	300	12	25
" " 38145	119	92/5	320	13	25
" " 38146	117	92/3	212	9	23
Guapiles MCZ 7989	124	104/9	380	15	25
Cariblanco BMNH 1907–10–9, 10	116	94/9	470	18	26
Peralta MNCR	—	—	—	—	—
Cartago Colleg. St. Luis Gonzaga	122	94/8	—	—	—
Parismina, M. Valerio coll.	—	—	—	—	—
5 km. North of Cartago MCZ 24526	112	91/9	425	18	24
No locality MCZ 24527	121	97/10	320	14	23
" " Seminario de San Jose	123	96/10	—	—	—
" " MNCR	121	98	—	—	—
" " "	118	86	—	—	—
Nicaragua:					
Rio San Juan (Colorado Jct.) USNM 19612	124	100/9	395	12	33
Rio San Juan USNM 19613	126	99/14	380	11	34
" " " " 19614	119	97/9	300	9	33
San Juan del Norte USNM 15630	118	92/8	340	15	23
" " " " USNM 15643	124	99/9	300	10	30
Bluefields USNM 37351	122	102/16	280	8	35
Escondido R. (50 mi. above Bluefields) USNM 20704	120	98/11	322	12	27

	prim.	sec.	length	diam.	1/d
El Bluffs, Bluefields AMNH 8397	121	99/8	—	—	—
Eden Mine AMNH 8399	116	101/16	375	11	34
Hac. Valencia, San Miguelito, Chontales Mts. AMNH 8396	122	103/11	470	19	26
Cape Gracias USNM 15311	122	102/16	280	8	35
San Ramon, 125 mi. up Rio Wanks BMNH 1908–5–29, 122	121	98/11	190	6	31
Boquete I. AMNH 8398	122	95/10	335	13	26
No locality USNM 15199	124	101/4	383	12	32
ANS 4928	118	97/10	277	9	30

Parker (1936) gives 119 primaries; 97 secondaries, last 10 complete; and 1/d 24 for the type of *Cryptopsophis multiplicatus*.

Gymnopis multiplicata oaxacae Mertens

1930. *Gymnopis multiplicata oaxacae* Mertens, Abh. Ber. Mus. Magdeburg **6**, **2**, p. 153, f. 14.

Type. Senckenberg 22130, Dr. K. Lafrentz, Dec. 1927.

Type locality. Cafetal Concordia (900 m. alt., between Puerto Angel and Salina Cruz), Oaxaca, Mexico.

Range. Guerrero, Oaxaca, and Chiapas, Mexico.

Diagnosis. Eyes usually visible; tentacular aperture very close to eye; primaries 121–137; secondaries 101–121; difference 10–26; 1/d 26–40; length 153–430 mm.

Description. The eye is visible in nearly all specimens. I could not make it out in the Mirador specimen, and Mertens failed to see it in one of the type series of five, so that two out of 15 lack eyes. Only five have the secondary count below 111, and three have the difference over 16.

Remarks. Lafrentz (1928, Blätt. Aquar. Terr. 39, 6, p. 115) says that the type series came from the "dungheap of the mule stable" and that the native name is "metlapil." He gives a photograph.

USNM 115058 contained four well formed young 104 mm. long, and 4 mm. in diameter, 1/d 26. The eye was conspicuous in all.

This form with its visible eye, inner mandibular teeth, posterior tentacle position, and nearly complete scalation, is presumably the most primitive member of the genus.

Its relations are obviously with *multiplicata*, as all the characters

overlap, although it has been possible to allocate all specimens without recourse to locality.

Specimens seen, ten, as follows:

	prim.	sec.	length	diam.	1/d
Mexico:					
Guerrero:					
Xaltianguis USNM 115057	133	121/11	153	4	38
El Limoncito, 15 km. N. Acapulco, EHT 16869	127	106/8	275	7	39
Oaxaca:					
Mirador AMNH 13448	128	114	373	11	34 no eyes
Cafetal Concordia					
Berlin 31696	127	101/7	275	8	34
" 31696	125	111/8	350	10	35
" 31696	130	117/13	430	15	29
No locality Vienna	137	121			
Chiapas:					
Tonala, E. H. Taylor	121	106/16	331	9	37
La Esperanza USNM 115058	121	103/11	283	7	40
30 km. N.E. Escuintla, 900 m., Mich 88205	121	106/11	335	12	28
Mertens' counts:					
	124	111/10	295	13	26 type
	125	114/9	390	15	26
	126	112/10	430	15	29
	125	111/12	400	14	28
	121	111/9	295	11	27 no eyes

Gymnopis oligozona (Cope)

1877. *Siphonops oligozonus* Cope, Proc. Amer. Phil. Soc. **17**, p. 91.
1879. *Gymnopis oligozona* Peters, Mon. Ak. Berlin, p. 939; Cope 1885, Proc. Amer. Phil. Soc. **22**, p. 171; Dunn 1928, Proc. New England Zoöl. Club **10**, p. 76.

Type. USNM 25187.
Type locality. Unknown.
Range. Known only from Guatemala.
Diagnosis. A Gymnopis without visible eyes; tentacular aperture

remote from nostril; primaries 128–135; secondaries 62–74; 1/d 44–64; length 255 mm. to 305 mm.

Description. Rather uniform dark, the primary grooves lighter and the top of the head lighter. The type has 12 teeth on a side in the upper jaw, ten on a side in the prevomero-palatine series, nine outer mandibular and one inner mandibular. The tentacular aperture is horseshoe-shaped, concave posteriorly, and quite far back as in *multiplicata.*

Specimens seen, three, as follows:

	prim.	sec.	length	diam.	1/d
Guatemala:					
Finca El Volcán, Alta Vera Paz U. Mich., Field No. 224	128	71/20	305	7	44
No locality. BMNH 87–4–12, 2	135	74/15	292	6.5	45
No data. USNM 25187	130	62/11	255	4	64

Remarks. The type is absolutely without any data at all. The British Museum specimen was received from the Basle Museum, and said to have been collected in Guatemala by Bernouilli. A note in the British Museum catalog says that Bernouilli visited Palenque, Flores, and Lake Itza. The Michigan specimen, collected by L. C. Stuart, gives at last a definite locality.

It is possible that the type of *oligozona* also served as the type of *Siphonops syntremus* Cope. The geographic and anatomical relationships of this form are clearly with *G. multiplicata.*

Gymnopis nicefori Barbour

1924. *Gymnophis nicefori* Barbour, Proc. Biol. Soc. Washington **37**, p. 125.

Type. MCZ 9609, collected by Hermano Niceforo Maria, March 1924.

Type locality. Honda, Magdalena Valley, Colombia.

Range. Known from Honda, Girardot, and San Juan de Rio Seco in the Magdalena Valley, and from Caceres in the Cauca Valley, Colombia.

Diagnosis. A Gymnopis with eyes usually invisible, apparently not under bone; tentacle very close to eye; primaries 133–158; secondaries 45–104; 43–88 primary folds without secondaries; 1/d 39–67; length 100–245 mm.

Description. The eye is visible in the specimens from Girardot and

San Juan. The color is "dark slate color, head a little lighter" (Barbour l.c.). The dentition of the type is given by Barbour as "maxillary teeth many, apparently about thirty; mandibular probably about equal in number, in two rows [I find no inner row in the type]." The Girardot specimen has 7 premaxillary-maxillary teeth on a side; 12 palatine; 10 outer mandibular; 0 inner mandibular. The mandibular teeth are twice the size of the maxillary or the palatine.

The Honda and Girardot specimens (4) have 150–158 primaries; 97–104 secondaries; 1/d 39–67. The Caceres specimen has only 138 primaries. The San Juan specimen is tiny, ill-preserved for counting, but appears to have 133 primaries and 45 secondaries.

Remarks. Probably directly allied to *unicolor* of Guiana, but just as similar to *oligozona* of Guatemala. Its relationships with *albiceps* are obscure.

Specimens seen, six, as follows:

	prim.	sec.	length	diam.	1/d
Colombia:					
Honda MCZ 9609	153	104/60	193	5	39 Type
" AMNH 23387	158	102/63	233	5	47
" AMNH 23388	150	97	178	4	44
Girardot Inst. La Salle	152	100	200	3	67
San Juan de Rio Seco MCZ 16089	133	45	100	2	50
Caceres Berlin 9524	138	95/67	245	6	41

Gymnopis unicolor (Duméril)

1863. *Rhinatrema unicolor* Duméril, Mém. Soc. Cherbourg, **9**, p. 321.
1863. *Rhinatrema concolor* Duméril, l.c., pl. 1, f. 6–7.
1879. *Gymnopis unicolor* Peters, Mon. Berlin Ak., p. 939; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 100; 1895, Proc. Zool. Soc. London, p. 410; Nieden 1913, Gymnophiona, p. 21.

Type. Paris 6 (three specimens one of which is labeled "type").

Type locality. Cayenne.

Range. Known only from Guiana.

Diagnosis. A Gymnopis with invisible eyes; primaries 100–120; secondaries 22–74; 41–87 primary folds without secondaries; 1/d 27-40; length 108–235 mm.

Description. Uniform dark.

Remarks. AMNH 1335, from "S. Amer.," has 22 fewer secondaries than have nine Guiana specimens, lowers their secondary count from 44 to 22, and raises the number of primary folds without secondaries from 64 to 87. Additional similar specimens, with locality, might be the basis for a different form.

Specimens seen, 15, as follows:

	prim.	sec.	length	diam.	1/d
Cayenne Paris 6	108	67/45	195	6	32
" "	113	63/45	205	6.5	31 type
" "	110	55/44	185	5.5	34
" BMNH 84–12–8, 5	115	68	230	6	38
" Berlin 9600	109	58	235	7	33
Guiana Paris 6a	—	—	160	5	32
" " 6b	114	—	187	6	33
" " 6c	120	56/22	200	6	33
" " 6c	118	74	195	5	39
" " 6c	113	59	200	6	33
" " 6c	—	—	154	5	30
" " 6c	—	—	109	4	27
" " 6d	—	—	108	3	36
Oke R., Cuyuni Trib., Brit. Guiana Field 35117	100	44/13	162	4	40
"S. Amer." AMNH 1335	109	22/5	189	5	34

Gymnopis albiceps (Boulenger)

1882. *Dermophis albiceps* Boulenger, Cat. Batr. Grad. Brit. Mus. (2), p. 98, pl. 8, f. 1.

Type. BMNH 80–12–5, 147.

Type locality. Ecuador.

Range. Known only from Prov. Santiago Zamora in the Oriente.

Diagnosis. A Gymnopis with visible eyes; tentacle between eye and nostril, slightly nearer eye; primaries 124–125; secondaries 45–55; 1/d 35–46; length 177–210 mm.

Description. "Blackish gray, the head white" (Boulenger, l.c.).

Remarks. This is the only South American Gymnopis with the tentacle remote from the eye. It has more primaries than any other form with a similar tentacle position. In counts of rings and in proportion

it is close to and somewhat intermediate between the Guianan *unicolor* and the Colombian *nicefori*, which have the eye usually invisible and the tentacle very close to the eye.

Specimens seen, two, as follows:

	prim.	sec.	length	diam.	1/d
Ecuador:					
No data. BMNH 80–12–5, 147	125	55	210	4.6	46
Prov. Santiago Zamora. Michigan 83051	124	45/15	177	5	35

Gymnopis mexicana mexicana (Duméril and Bibron)

1841. *Siphonops mexicanus* Duméril and Bibron, Erpét. Gen. **8**, p. 284; Cuvier 1849, Regne Animal (3), pl. 36, f. 1, 6; Duméril 1863, Mem. Soc. Cherbourg **9**, p. 318, pl. 1, f. 10; Brocchi 1882, Miss. Sci. Mex., p. 120, pl. 21, f. 2.

1850. *Siphonops mexicana* Gray, Cat. Batr. Grad. Brit. Mus., p. 59.

1879. *Dermophis mexicanus* Peters, Mon. Ak. Berlin, p. 927, f. 6; Cope 1879, Proc. Amer. Phil. Soc. **18**, p. 265; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 98, pl. 8, f. 2; Cope 1885, Proc. Amer. Phil. Soc. **22**, p. 171; 1887, Bull. U. S. Nat. Mus. **32**, p. 9; 1888, Journ. Morph. 2, **2**, p. 300, pl. 22, f. 6 (otic region); 1889, Bull. U. S. Nat. Mus. **34**, pl. 51, f. 21 (hyoid); Boulenger 1895, Proc. Zool. Soc. London, p. 404; Günther 1902, Biol. Centr. Amer., p. 305; Nieden 1913, Gymnophiona, p. 8; Ochoterena 1932, Ann. Inst. Biol. [Mexico] 3, **4**, p. 363 (integument).

1928. *Dermophis mexicanus mexicanus* Dunn, Proc. New England Zoöl. Club **10**, p. 74, pl. 5 (breeding habits).

Type. Paris 5c.

Type locality. Mexico.

Range. Oaxaca and Vera Cruz, Mexico, to western Nicaragua.

Diagnosis. A Gymnopis with visible eyes; tentacle between eye and nostril, slightly nearer eye; primaries 97–110; secondaries 51–80; 1/d 14–26; length 152–485 mm.

Description. The belly is usually light in color. The scales appear first in the posterior half of the segmental folds on the sides (after the eleventh primary in U. Mich. 64354a from Guatemala). They are present in both halves, dorsally, laterally and ventrally in the posterior part of the body where the secondaries are present and complete. Mich. 64354a has 7–8 premaxillary teeth; 11–12 maxillary; 17–18 palatine; 15 mandibular; no inner mandibular. USNM 51380 has the

tentacle equidistant from eye and nostril; U. Mich. 64354a has the tentacle 3 mm. from the eye and 4 mm. from the nostril, which is the usual position.

Sixty-two specimens have been counted for primaries and secondaries. The extremes are: five specimens with 97, 100, 110, 110, 110 primaries from Nicaragua, Central America, Nicaragua, Guatemala, and Mexico respectively; 57 specimens fall into the narrow range of 101–109 primaries. The extremes in secondary count are: 51, 51, 52, 78, 80, from "N. E. Mexico," Tabasco, Vera Cruz, Tehuantepec and Chiapas respectively; 57 specimens have from 55–75 secondaries. No sexual difference has been found in the counts of secondaries, primaries, or complete secondaries.

The length-diameter ratio (always somewhat untrustworthy) has been computed for 51 specimens. An adult pregnant female is, naturally, the fattest, with the low ratio of 14. The slimmest are 23, 24, 25, 26 from Mexico, and one with 24 from Salvador. The four fattest are two from Mexico and two from Guatemala. Aside from the pregnant female, no sexual difference can be made out, and no changes in proportions with age are apparent.

None of the figures on proportions or segment counts give any indication of a geographical trend.

Habits. The animal is viviparous. MCZ 12122 from Guatemala was a pregnant female 430 mm. long (Dunn 1928, pl. 5). It had six young in the left oviduct and four in the right. The young were 145 mm. long.

Remarks. This form with its three races resembles in tentacle position *parviceps* from Panamá and *albiceps* from Ecuador.

Specimens seen, 66, as follows:

	prim.	sec.	length	diam.	1/d
Mexico:					
Vera Cruz:					
Cuatotolapam Mich. 41571	107	72/12	327	19	17
41572	105	70/12	374	21	18
Vera Cruz ANS 4886	105	55/6	355	17	21
4887	105	55/6	228	11	21
4888	105	55/6	—	—	—
4889	106	59/6	340	19	18
4890	104	59/6	232	11	21
" " AMNH 6306	102	58/12	354	18	20

	prim.	sec.	length	diam.	1/d
Oaxaca:					
Tehuantepec MCZ 1604a	108	69/15	281	17	16
1604b	109	73/11	425	17	25
Hamburg 310	103	61	—	—	—
Barrios USNM 30535	106	78/11	378	24	16
30536	105	60/0	170	7	24
30537	—	———	—	—	—
Tabasco:					
Tabasco USNM 25102	105	61/9	365	18	20
Teapa BMNH 1907–12–19, 135	104	51/7	—	—	—
Chiapas:					
La Zacualpa AMNH 897	102	72/5	—	—	—
898	107	74/9	—	—	—
899	105	69/9	—	—	—
2½ km. W. Soconusco, 50 m. Mich. 88203	102	73/8	280	15	19
6 mi. NE. Escuintla, 150 m. Mich. 88202	103	74/14	350	23	15
88204	106	80/10	310	17	18
? State ?					
Finca Berlin 24051	—	———	460	30	15
St. Augustin Paris 5	104	69/10	475	27	17
"	101	62/6	387	19	20
"	106	73/10	388	17	23
"N.E. Mexico" ERD	110	51/5	395	15	26
"Mexico" Paris 5c	105	60/5	365	20	18
Berlin 9104	—	———	—	—	—
AMNH 13445	104	58/2	210	12	17
13446	105	61/2	283	13	22
13813	104	63/2	320	16	20
Guatemala:					
No locality USNM 25641	105	74/10	440	23	19
Hamburg 1926	103	70/6	—	—	—
Senck, 2098b	103	73/9	—	—	—
MCZ 12121	108	62/9	420	23	19
12122	109	69/10	430	30	14
12123	108	70/11	240	15	16

	prim.	sec.	length	diam.	l/d
Pacific side BMNH 64–1–26, 397	106	68/10	463	24	19
64–1–26, 152	110	62/7	390	18	22
Escuintla USNM 12691	—	———	—	—	—
Retalhuleu Senck, 2098a	107	72/16	—	—	—
Finca El Cipres, Volcan Suchil, Prov. Suchetepequez Mich. 64354	105	65/9	350	—	—
	102	65/14	485	29	17
	105	65/10	210	13	16
	104	66/11	222	14	15
	106	73/9	160	10	16
	106	73/8	172	10	17
	101	64/8	280	15	19
" MCZ 11222	108	67/8	460	22	21
11223	105	65/5	395	21	18
Salvador:					
Volcan Isalco ANS 4925	110	75/8	165	7	24
No data Mus. Na. Salvador	105	73/15	152	7	22
BMNH 1906–11–8, 2	107	64/7	395	20	20
Honduras:					
Amapala USNM 51380	107	68/7	350	18	19
No data Berlin 13207	103	61	—	—	—
Nicaragua:					
Polvon MCZ 1491a	105	60/11	—	—	—
1491b	107	57/7	350	16	22
2165a	104	54/10	185	9	20
2165b	106	70/15	395	20	20
" AMNH 1153	97	55/7	261	16	16
18667	105	59/12	305	16	19
No data USNM 16147	110	62/13	356	19	19
Mich. 65674	106	66/5	336	19	17
(?) Panamá:					
No data BMNH 67–9–23, 3	104	63/10	430	21	20
Central America:					
No data USNM 30008	100	64/9	345	18	19

It has also been recorded from Atitlan, Guatemala, by Brocchi (1883).

Gymnopis mexicana clarkii (Barbour)

1926. *Gymnophis clarkii* Barbour, Occ. Papers Boston Soc. Nat. Hist. **5**, p. 191.

1928. *Dermophis mexicanus clarkii* Dunn, Proc. New England Zoöl. Club **10**, p. 73.

Type. MCZ No. 11047, collected by Dr. Herbert Clark, June, 1925.

Type locality. Tela, Honduras.

Range. Known only from Tela and San Pedro Sula, Honduras.

Diagnosis. A Gymnopis with visible eyes; primaries 101–107; secondaries 41; 1/d 16–19; length 145–420.

Description. Only four specimens are known, so that little can be added to the diagnosis save that the color is "as usual, plumbeous," and that the tentacle is well in advance of the eye.

Remarks. The type was 145 mm. long, and since this is the length of an unborn embryo of *mexicana mexicana*, it must have been very young. The primary count is that of *mexicana*, and only the low secondary count (41 as against 51–80) distinguishes it.

Specimens seen, four, as follows:

	prim.	sec.	length	diam.	1/d
Honduras:					
Tela, MCZ 11047	107	41/0	145	9	16
" " 11779	107	41/4	420	25	17 TYPE
San Pedro Sula, AMNH 33386	101	41/5	350	18	19
No locality AMNH 49953	104	41	380	—	—

Gymnopis mexicana gracilior (Günther)

1902. *Dermophis gracilior* Günther, Biol. Centr. Amer., Amph., p. 306, pl. 76, f. B; Nieden 1913, Gymnophiona, p. 9.

1928. *Dermophis mexicanus gracilior* Dunn, Proc. New England Zoöl. Club, **10**, p. 73.

Type. BMNH 1901–12–19–137.

Type locality. Chiriqui, Panamá.

Range. Pacific slope of Costa Rica; Chiriqui, Panamá. Sea level to 4000 feet.

Diagnosis. A Gymnopis with visible eyes; primaries 95–102; secondaries 32–78; 1/d 25–32; length 192–345 mm.

Description. The color and the tentacle position are as in *G. m. mexicana.*

Remarks. Three out of four specimens of this species are slimmer than any *mexicana* seen. The exception is a pregnant female which is as stout as the slimmest *mexicana* seen. This individual contained six well formed young which measured 100–106 mm., and about 6 in diameter, yolk still being noticeable. The Panamá specimens have the usual secondary count of *mexicana*, but the single Costa Rican one has a very low count.

Specimens seen, four, as follows:

	prim.	sec.	length	diam.	1/d
Costa Rica:					
Pozo Azul BMNH					
1907–6–28, 27	100	32	192	6	32
Panamá:					
Chiriqui BMNH					
1901–12–19, 137	95	73/10	343	11	31
Boquete Cal. Acad.+Sci.					
79463	99	68/8	325	13	25
Boquete Cal. Acad.+Sci.					
79464	102	78/9	345	11	31

Gymnopis parviceps (Dunn)

1924. *Siphonops parviceps* Dunn, Occ. Papers Boston Soc. Nat. Hist. **5**, p. 93; 1928, Proc. New England Zoöl. Club, **10**, p. 74 (breeding habits).

Type. MCZ 9407, collected by E. R. Dunn and Chester Duryea, Aug. 6, 1923.

Type locality. La Loma (or Buenavista, another name), at elevation of 1200 feet (erroneously 2000 in original description), on the trail from Chiriqui Lagoon to David, Atlantic slope in Province of Bocas del Toro, Panamá.

Range. Known only from type locality.

Diagnosis. 96 primaries; 13 secondaries; 1/d 22.

Description. Primary folds all complete, extending to anus; secondary folds 13, first three incomplete; scales present all over in region of complete secondaries; maxillary teeth 13, palatine teeth 10, mandibular teeth 10; tentacle between eye and nostril, nearer to lip than to either, slightly nearer to eye than to nostril; eye nearer to lip than to

tentacle, nearer to lip than is the nostril; eyes farther apart than length of snout. Black; head lighter, tinged with brown. Length 180 mm.; diameter of head 5 mm., neck 5 mm., body 8 mm.; posterior angle of mouth to tip of snout 6 mm.; ratio of length to diameter 22.

Habits. We were eating breakfast in a palm thatch hut when one of our men called attention to a "snake" which was coming out of the ground under the raised platform on which we slept. The whole terrain was steep slopes. The animal was impossible to extricate from its burrow by pulling, and was dug out. The peculiar bottle-shape of the beast (possibly because it was a pregnant female) was immediately noticeable and was the cause of the difficulty of extraction. Later, three perfectly formed young were found in the right oviduct. They measure 76 mm., and the diameter is about 3.5 mm., 1/d 21.

Remarks. My lack of knowledge of South American forms and of the correlations of scales and secondaries in Caecilians led me to place this form originally in Siphonops. The eye and the tentacle are nearer the lip than in *Gymnopis mexicanus mexicanus*, but the relative distance of tentacle, eye, and nostril is the same in both.

The low secondary count makes the species remarkably distinct.

Siphonops Wagler

1828. *Siphonops* Wagler, Isis **21**, p. 742 (monotype *Caecilia annulata* Mikan).

Diagnosis. Caecilians with no tail; no secondaries; no scales; tentacle on side of head, between eye and nostril, nearer to eye and usually very close to it; no inner mandibular tooth row; no dorsal fin; anal region not a sucking disk; eye usually visible; primaries 81–133; 1/d ratio 16–54; length 126–535 mm.; five forms.

Range. Colombia to southern Brazil and Paraguay. Argentina (?)

Key to species of Siphonops

A. Large species; primaries grooves white.
  B. Primaries 81–100; black and white in preserved specimens. *annulatus*
  BB. Primaries 102–118; brown and white in preserved specimens. *paulensis*
AA. Small species; unicolor.
  B. Primaries 95–104 ..... *hardyi*
  BB. Primaries 108–112 ..... *insulanus*
  BBB. Primaries 120–133 ..... *brasiliensis*

Remarks. *S. paulensis* occurs within the range of *annulatus,* and occupies dry regions back of the coast range.

S. insulanus, which is intermediate between *hardyi* and *brasiliensis,* is an insular form, while the two more extreme mainland forms may occur together.

I have examined 253 specimens of Siphonops, and these include the types of *annulatus, crassus, paulensis,* and *hardyi.* I have not been able to examine the types of *interrupta, brasiliensis, insulanus, maculatus,* or *marmoratus.*

Siphonops annulatus (Mikan)

1820. *Caecilia annulata* Mikan, Delect. Flor. Faun. Bras., pl. 11; 1924 Spix, Serp. Bras., p. 74, pl. 26, f. 1; 1829 Cuvier, Regne Anim. (2), **2**, p. 100; 1831 Gray, in Griffith's Cuvier's Anim. King. **9**, App., 110.

1828. *Siphonops annulatus* Wagler, Isis **21**, p. 742, pl. 10, f. 1, 2; 1830, Nat. Syst. Amphib., p. 198; 1838 Tschudi, Mem. Soc. Sci. Nat. Neuchatel **2**, p. 90; 1841 Duméril and Bibron, Erp. Gen. **8**, p. 282, pl. 85, f. 1; 1863 Duméril, Mem. Soc. Sci. Nat. Cherbourg **9**, p. 317, pl. 1, f. 2; 1868 Cope, Proc. Acad. Nat. Sci. Philadelphia, p. 118; 1879 Peters, Mon. Ak. Berlin, p. 940, f. 10; 1879 Wiedersheim, Anat. Gym. pl. 1, f. 1–13, pl. 2, f. 27, 32–34, pl. 3, f. 37–44, pl. 7, f. 82, pl. 9, f. 83; 1882 Boulenger, Cat. Bat. Grad. Brit. Mus. (2), p. 102, pl. 8, f. 4; 1889 Cope, Bull. U. S. Nat. Mus. **34**, pl. 53, f. 1, pl. 56, f. 3; 1892 Boettger, Kat. Amph. Mus. Senckenberg. p. 62; 1895 Boulenger, Proc. Zool. Soc. London, p. 412; 1899 Goeldi, Zool. Jarhb. Syst. **12**, p. 120, pl. 9, f. 1–4; 1911 Ihering, Rev. Mus. Paulista **8**, p. 108, f. 1, 2, 3, 6, 7; 1912 Phisalix, Cong. Int. Zool **8** (Graz), pl. 4, f. 5 (integ.); 1913 Nieden, Gymno., p. 25, f. 1; 1915 Spengel, Blatt. Aq. Terr. **26**, p. 220; 1927 Muller, Abh. Senckenberg. Mus. **40**, p. 260; 1936 Sawaya, Rev. biol. hyg. (2) **7**, p. 80, pl. 7; 1937 Bull. Univ. São Paulo **1**, Zool. 1, pl. 30, f. 1–2, pl. 32, f. 13–15.

1829. *Caecilia interrupta* Cuvier, Reg. Anim. (2), **2**, p. 100.

1863. *Siphonops indistinctus* Duméril, Mem. Soc. Sci. Nat. Cherbourg **9**, p. 318 (in part, the dried specimen).

1885. *Dermophis crassus* Cope, Proc. Amer. Phil. Soc. **22**, p. 184 (upper Beni R., Bolivia).

1937. *Siphonops annulatus marmoratus* Sawaya, Bull. Univ. São Paulo **1**, Zool. 1, p. 238, pl. 30, f. 4–5; pl. 31, f. 7 (Theresopolis, Rio de Janeiro, Brazil).

Type. Paris 15.

Type locality. Sebastianopolis, Brazil.

Range. From "Argentina or Paraguay" and Rio Grande do Sul,

Brazil, to Bolivia, Guiana, Venezuela, and the eastern part of Peru, Ecuador, and Colombia. Upper Cauca River, Colombia.

Diagnosis. A Siphonops with white primary grooves; eye distinct; primaries 81–100; 1/d 16–43; length 126–535 mm.

Variation. In Mus. Nac. Brazil 831, from Theresopolis, Rio de Janeiro, the tentacle is slightly nearer the nostril than the eye, the snout is unusually long, and the hind end of the body is acuminate. In six from Serra de Maché, Rio de Janeiro, Mus. Paul. 940 A-E, and in one from "Brazil," Paris 17, the tentacle is almost equidistant between eye and nostril. In proportions and primary count these specimens do not differ from others which have the tentacle in the normal position closer to the eye.

The primary count ranges from 85 to 95 in 171 specimens (160 seen and 11 reported). Six specimens (four seen and two reported) have 81–84, and these are all from the southern part of the range. Seven specimens (five seen and two reported) have 96–100, and five of these are from the western and northern parts of the range.

The majority of the measured specimens (79) have the 1/d ratio from 20–30. The 20 stouter specimens ((1/d 16–19) include the five smallest and three of the twelve largest; and seven out of eleven Colombian specimens. The seven slim specimens (33–43) are all from the south, and the slimmest is dried somewhat.

Remarks. Sawaya's *marmoratus* is a color variety, not a geographical race.

Goeldi (1899) says it lives by preference in dry localities. He speaks of a female found rolled up under an old stump in a very dry place at Colonia Alpina, near Theresopolis, in the Organ Mts., Rio de Janeiro. In the middle of the coil was a clump of six eggs, in a continuous string, from each end of which there was a free, thread-like, projection. The eggs measured 10 by 8.5 mm. The contained embryos were 4 mm. in diameter, with two external gills on the left side and three on the right. The find was made in December.

Sawaya (1936) speaks of this species being eaten by the snake *Pseudoboa clelia.*

The only close ally is *paulensis.* The two are known to occur together in two localities. *S. annulatus* has a vastly wider range, which practically encloses that of *paulensis.*

Specimens seen, 175, as follows:

	prim.	length	diam.	1/d
Argentina or Paraguay:				
No locality, Hamburg 1064	87	175	5	35

Brazil:	prim.	length	diam.	1/d
Santa Catharina, Joinville, Vienna	87	—	—	—
Joinville AMNH 23693	88	322	15	21
	prim.	length	diam.	1/d
São Paulo,				
Taubaté, Mus. Paul. 942	86	278	14	20
Franca " 953	95	400	24	17
Interior MCZ 10782	93	201	7	29
No locality				
Hamburg 911–912	85 (4)			
(35 spec.)	86 (4)			
	87 (5)			
"	88 (7)			
	90 (8)			
	91 (5)			
"	92 (2)			
AMNH 23470	86			
23471	86			
23472	86	335		
" 23473	90	350		
23474	87			
23475	88	275	7	39
23476	87			
" 23477	86			
Berlin 5968	—	—	—	—
Munich 140/1912	87	185	9	20
Rio de Janeiro:				
No locality				
MCZ 290	92	375	14	27
" 328	84	310	17	19
Berlin 3704	91	405	12	34
Krakau 14671	94	—	—	—
" "	92	—	—	—
BMNH 74–5–21–7	89	325	13	25
AMNH 23503	84	327	18	18
Serra de Macahé,				
Mus. Paul. 940	85	242	10	24
940A	82	179	9	19
" 940B	85	185	9	20
940C	85	253	12	21

	prim.	length	diam.	1/d
Mus. Paul. 940D	86	225	10	22
940E	91	378	14	27
Petropolis				
Vienna	86	—	—	—
MCZ 2481	88	145	9	16
" "	85	205	13	16
Munich 140/1912	83	—	—	—
" "	89	325	13	25
Theresopolis				
Munich	93	350	17.5	20
Mus. Nac. Brazil 540	93	290	11	26
" " " 831	91	305	13	23
Neu Friburgo				
Hamburg 1093	94	320	15	21
USNM	89	—	—	—
USNM	87	—	—	—
USNM	92	—	—	—
USNM	88	—	—	—
Espiritu Santo:				
Sta. Tereza, 700 m.				
Mus. Nac. Brazil 842	91	370	18	21
Sta. Tereza, 760 m.,				
Mus. Nac. Brazil 843	92	147	8	18
Pau Gigante, Mus. Nac.				
Brazil 847	88	295	16	18
No locality				
Hamburg 1353	90	350	11	33
" "	89	171	6	28
Frankfort 21026	89	—	—	—
Berlin 14043	87	385	10	38
Vienna	89	160	6	26
"	91	190	8	23
"	93	395	14	28
"	89	355	15	24
"	91	350	15	23
Mts. between Espiritu Santo and Minas Garaes,				
Hamburg 1354	93	360	12	30
" "	91	300	9	33

	prim.	length	diam.	1/d
Hamburg 1354	94	245	9	27
" "	90	210	8	28
" "	90	178	8	22
" "	93	165	5.5	30
Minas Geraes,				
Mendez, on Rio Jequitinhonha,				
Vienna	92	—	—	—
Bahia.				
No locality,				
MCZ 1528	95	367	16	23
AMNH 18668	88	356	14	25
" 23502	93	283	16	18
Vienna	93			
"	90			
Berlin 9526	93	315	11	29
Hamburg 1355	92	382	13	29
Paris 15e	100	157	7	22
BMNH 61-3-23-20	92			
" 62-1-30-62	91	171	7	24
" 69-2-22-6	95	225	9	25
" 1924-9-20-0	93	210	10	21
Amazonas, Tabatinga,				
Vienna	97	—	—	—
Lagoa Japaranão, near Teffé				
MCZ 1520	88	360	16	22
? State?				
Tozuzu,				
Berlin 7169	95	128	6	21
Brazil, no locality:				
Paris 15	86	—	—	—
" 15d	94	450	24	Type 19
" 17	91	261	6	43
AMNH 23501	84	284	13	dry 22
Hamburg 1094	90	323	13	24
Frankfort 2102a	89	—	—	—
" "	88	364	17.5	20
USNM 58749	93	190	18.5	22

	prim.	length	diam.	l/d
Bolivia:				
Near Riberalta AMNH 15000	93	—	—	—
Upper Beni R.				
MCZ 6636	98	300	12	25
		cotype *Dermophis crassus*		
ANS 11344	94	348	13	27
		cotype *Dermophis crassus*		
Peru:				
No locality				
ANS 11346	92	420	17	25
		cotype Dermophis crassus		
Moyabamba				
BMNH 74-8-4, 5	94	425	18	24
" 74-8-4, 6	94	385	16	24
Iquitos, AMNH 42850	94	420	21	20
E. of Contamna, Peru Brazil frontier				
AMNH 42835	94	280	11	25
San Antonio, Rio Itaya				
AMNH 42842	91	337	13	26
" 42843	92	378	17	23
" 42844	92	310	13	24
" 42845	91	413	15	21
" 42846	93	380	15	25
" 42847	91	410	18	23
" 42848	90	380	16	24
" 42849	89	263	11	24
Pampa Hermosa, middle Ucayali, mouth of Cushatabay				
AMNH 42838	96	185	7	26
" 42839	93	300	14	21
Rio Cenipa, upper Marañon				
AMNH 42836	89	295	13	23
" 42837	90	225	10	22
Mouth of Santiago, upper Marañon				
AMNH 42833	89	280	11	25
" 42834	93	425	17	25
Ecuador:				
Sarayacu U. Michigan 89460	91	—	—	—
BMNH	92	148	9	16

	prim.	length	diam.	l/d
Pastaza R. (Canelos to Marañon R.)				
MCZ	90	160	9	18
"	87	245	13	19
"	90	290	14	21
"	91	385	13	30
"	92	345	14	25
"	93	—	—	—
"	96	—	—	—
"	94	375	19	20
"	90	360	17	21
"	91	345	18	20
No locality				
Berlin 9814	94	200	10	20
AMNH 17448	87	535	20	27
U. Michigan (5)	—	—	—	—
Colombia:				
Villavicencio Inst. La Salle	93	126	7	18
" " "	89	290	18	16
AMNH 23270	85	355	19	19
" 23171	91	415	20	21
Medina Mts., N. E. of Villavicencio				
AMNH 49955	95	365	15	24
" 49956	94	340	15	23
" 49957	91	347	18	19
" 49958	92	257	13	20
Guaicaramo				
AMNH 23384	92	430	23	19
" 23385	87	144	8	18
" 23386	85	171	10	17
Cayenne:				
No locality, Paris 15c	86	—	—	—
Surinam:				
No locality, Paris 15b	90	—	—	—

	prim.	length	diam.	1/d
Venezuela:				
Barinas, Zamora Prov., Munich	94	320	12	27
South America:				
No locality AMNH 49975	91	336	15	22

Besides the localities listed above, Ihering (1911) has recorded *annulatus* from the following places in Brazil: Rio Doce, Espiritu Santo; Pelotas, Rio Grande do Sul; the State of Matto Grosso. Spengel (1915) records it from Para.

Siphonops paulensis Boettger

1892. *Siphonops paulensis boettger*, Kat. Batr. Mus. Senckenbergianum. p. 62; Boulenger 1896. Proc. Zool. Soc. London, p. 412; Ihering 1911. Rev. Mus. Paulista **8**, pp. 91, 92, 109; Nieden 1913. Gymnopiona, p. 25; Serié 1918–19, Physis, **4**, **17**, p. 361; Sawaya 1937, Bull Univ. São Paulo **1**, Zool. 1, p. 238, pl. 31, f. 11.

1937. *Siphonops paulensis maculatus* Sawaya, Bull, Univ. São Paulo, **1**, Zool. 1, p. 240 (Theresopolis, Rio de Janeiro, Brazil).

Type. Mus. Senck. 2102, 1b.

Type locality. São Paulo, Brazil.

Range. States of Rio Grande do Norte, Goyaz, Matto Grosso, Rio de Janeiro, and São Paulo, Brazil; Villarica, Paraguay; Sta. Cruz. and Buenavista, Bolivia; San Ignacio, Missiones, Argentina.

Diagnosis. A Siphonops with white primary grooves; primaries 102–118; 1/d 22–39; tentacle anterior to and a little below eye; eye distinct; length 139 to 480 mm.

Description. Boettger described *paulensis* as slimmer than *annulatus;* with more primaries; smaller head; different tentacle position; different color.

Eight specimens under 300 mm. in length have the 1/d ratio 22–28; sixteen between 300–350 have it 23–38; eleven between 350–400 have it 25–38; nine over 400 have it 27–39. Forty-two *annulatus* from the south have it 16–39, six above 30. This character is not diagnostic. Boettger gives an 1/d of 32 for *paulensis.*

Boettger gives a range of primaries of 110–115. Ihering says 20 São Paulo specimens had 114–116, except for one with 111. I count 106–117 on eighteen São Paulo specimens and 104–110 on seven from Goyaz.

Nine from Paraguay have 104–116; seven from Bolivia have 102–113. The maximum count in southern *annulatus* is 96, the minimum 81.

Sawaya (1937) has recorded a maximum of 118 for *paulensis*.

The primaries are interrupted dorsally in some of the Paraguay series.

Preserved specimens are brown, while *annulatus* is black.

The size of the head I cannot see to be different from that of *annulatus*.

The position of the tentacle seems to me to be exactly that of *annulatus*, with the exception that some *annulatus* have it quite far from the eye.

The number of rings is the best differentiating character, but since three *annulatus* from Bahia, Upper Beni R., and Tabatinga, have 100, 98, and 97 annuli respectively, this difference may be very slight.

Habits. Ihering (1911) says it is the commonest species in the environs of São Paulo City, is found in "dry places such as the range of Ypiranga," lives in ant hills but does not eat the insects, and has had the egg capsule of a spider in its stomach.

Remarks. Its only ally is *annulatus*, to which it is remarkably close. Both occur in the states of São Paulo and Matto Grosso, and in Paraguay and Bolivia. The only *locality* from which I have seen both is Taubaté in São Paulo. The two specimens recorded from there were approximately of the same proportions; *annulatus* 278/14 = 19.8; *paulensis* 286/13 = 22. The *annulatus* had 86 primaries; the *paulensis* 109. Both are reported by Sawaya from Theresopolis, Rio de Janeiro. *Paulensis* seems to be more an inhabitant of the high interior, although its range seems to be completely surrounded by the range of *annulatus*. The range has a remarkable similarity to that of *Cnemidophorus ocellatus*, and it is probable that it inhabits the savanna country which stretches back of the coast from Rio Grande do Norte southwest to São Paulo.

Sawaya's *maculatus* is not a race but a variety, as it is an occasional occurrence in the midst of normal *paulensis*.

Specimens seen, 44, as follows:

Brazil:		prim.	length	diam.	1/d
São Paulo:					
Taubaté, Mus. Paul.	1013	109	286	13	22
Ypiranga " "	939	112	398	16	25
" " "	947	110	363	13	28
" " "	947A	114	360	16	22

		prim.	length	diam.	1/d
Ypiranga Mus. Paul.	947B	114	380	11	34
" " "	949	110	317	13	24
" " "	949A	114	334	13	26
" " "	951	106	326	14	23
" " "	951A	108	341	9	38
" " "	951B	110	330	13	25
" " "	956	117	303	12	25
" " "	956A	112	227	11	24
São Paulo AMNH	23624	111	373	12	31
Frankfort	2102, 1a	115	418	13	32
	2102, 1b	110	340	12	28 TYPE
	2102, 1c	115	380	10	38
BMNH	94–7–25, 9	111	420	12	35
Munich	283/1920	111	330	10	33
Matto Grosso:					
Corumba BMNH	92–4–20, 23	109	190	7	27
Goyaz:					
Annapolis, 1000 m.,					
AMNH	43855	106	470	15	31
	43856	105	440	15	29
	43858	106	139	5	28
	43859	104	455	17	27♂
	43860	110	480	13	37
	43861	108	362	14	26
	43862	106	153	6	25
Rio Grande do Norte:					
Ceara Mirim, Cal. Acad. Sci.	49897	113	290	12	24
Paraguay:					
Villarica AMNH	19920	116	395	16	25
	19921	115	380	13	29
	19922	116	358	13	27
	19923	115	314	12	26
	19924	113	398	13	31
	19925	107	304	10	30
	19926	116	305	10	30
	19927	115	340	12	28
No locality AMNH	23433	104	461	16	39

Bolivia:	prim.	length	diam.	1/d
Sta.Cruz. 500 m., Carnegie 1159S	108	217	9	24
" " " 11599	106	166	7	24
" " " 2643	102	302	9	33
Buenavista BMNH 1927–8–1, 135	105	332	10	33
" " " 136	113	435	15	29
" " " 137	109	328	9	36
" " " 138	110	317	9	35
No data.				
Berlin 4	112	450	13	34

Ihering (1911) has recorded a specimen in the Museu Paulista from Raiz de Serra, São Paulo. Sawaya (1937) has recorded *paulensis* from Theresopolis, Rio de Janeiro, Brazil. Serié (1918–19) has recorded *paulensis* from San Ignacio, Missiones, Argentina.

Siphonops hardyi Boulenger

1888. *Siphonops hardyi* Boulenger, Ann. Mag. Nat. Hist. (6), **1**, p. 189; 1891, Ann. Mag. Nat. Hist. (6), **8**, p. 457; 1895, Proc. Zool. Soc. London, p. 412, pl. 24, f. 3; Ihering 1911, Rev. Mus. Paulista, **8**, p. 109; Nieden 1913, Gymnophiona, p. 26.

Type. BMNH No. 87–12–29–39, collected by M. F. Hardy de Drénduf.

Type locality. Porto Real, Rio de Janeiro, Brazil.

Range. The states of Rio de Janeiro and São Paulo, Brazil, in mountains of the coast ranges.

Diagnosis. A Siphonops of uniform color; primaries 95–104; 1/d 27–45; eye distinct; tentacle a little anterior to and below the eye; length 136–178 mm.

Description. "Teeth small, subequal"; "uniform blackish" (the Ypiranga specimen is gray, lighter below); tentacle very near eye; primaries complete; Ihering gives 100 primaries for a specimen from Ypiranga, and 95 for one from Serra de Macahé. Boulenger (1895) says "eye more or less distinct"; and "tentacle close to and very slightly below eye."

Habits. Not known.

Remarks. This is the shortest species of the *hardyi-insulanus-brasiliensis* group. The proportions are much the same in all three, the tentacle position is not diagnostic, although Boulenger (1891) states

that the tentacle is closer to the eye in *hardyi* than it is in *brasiliensis*. The only real differences between the three are the number of primaries. The maximum number in *hardyi* is 104, *insulanus* has 108–112, and *brasiliensis* has 120–133. Both *hardyi* and *insulanus* are quite small (max. length 178 mm., and 200 mm. respectively) while *brasiliensis* reaches a length of 312 mm.

Specimens seen, nine, as follows:

	prim.	length	diam.	1/d
Rio de Janeiro:				
Porto Real				
BMNH no. 87-12-29-39	104	145	4	36 TYPE
" 91-6-16-14	102	150	4	37
" 91-6-16-15	100	145	4	36
Mambucaba, Mus. Nac. Brazil 841	103	136	3	45
Organ Mts. BMNH 1902-11-25-11	97	178	5.5	32
Tijuca, Fed. Dist. M, C. Z. 24954				
Serra de Macahé	95	152	4	38
Mus. Paul 962	99	160	6	27
" 962A	97	174	6	29
São Paulo:				
Ypiranga				
Mus. Paul. 944	96	170	5	34

Siphonops insulanus Ihering

1911. *Siphonops insulanus* Ihering, Rev. Mus. Paulista, **8**, p. 109; Nieden 1913, Gymnophiona, p. 26.

Type. In Museu Paulista, not seen.

Type locality. I. Victoria and I. São Sebastião, off coast of São Paulo, Brazil.

Range. Known only from the type localities.

Diagnosis. A Siphonops of uniform color, primaries 108–112; 1/d 31–41; eye indistinct; tentacle a little anterior to and below the eye; length 152–200 mm.

Description. Little can be added to the diagnosis. Ihering says all the rings "are interrupted in the dorsal region and at times a little on the ventral line." The color is uniform light gray. The tentacle is very

close to the eye and a little below. Of the four specimens seen the eye was invisible in two. The primaries were interrupted dorsally in the middle of the body in one out of four. Ihering mentions a length of 200 mm., and a length-diameter ratio of 41.

Habits. Not known.

Remarks. Allied to *hardyi* and to *brasiliensis,* and apparently between the two.

Specimens seen, four, as follows:

	prim.	length	diam.	1/d
Isla Victoria:				
Mus. Paul 946	108	157	5	31
" 946A	110	194	5	39
			eye invisible	
" 946B	111	152	4	38
			eye invisible	
Isla S. Sebastião				
Mus. Paul. 945	112	162	4	40

Siphonops brasiliensis Lütken

1851. *Siphonops brasiliensis* Lütken, Vid. Meddel., p. 52; Reinhardt and Lütken 1861, Vid. Meddel. p. 202; Boulenger 1891, Ann. Mag. Nat. Hist. (6), **8**, p. 457; 1895, Proc. Zool. Soc. London, p. 412; Ihering 1911, Rev. Mus. Paulista, **8**, p. 110; Nieden 1913, Gymnophiona, p. 25; Parker and Wettstein 1929, Ann. Mag. Nat. Hist. (10), **4**, p. 594.

1879. *Dermophis ? brasiliensis* Peters, Mon. Ak. Berlin, p. 938.

Type. In Copenhagen Museum, collected by Langgaard. Not seen.

Type locality. Brazil.

Range. Known from the states of Santa Catharina, São Paulo, Minas Geraes, and Rio de Janeiro, Brazil.

Diagnosis. A Siphonops with uniform color; primaries 115–133; 1/d 31–54; tentacle somewhat anterior to and below the eye; eye indistinct; primaries frequently interrupted; length 167–312 mm.

Description. The original description gives 133 primaries; the 20 first and the last 13 complete; "gray"; 1/d 46. The eye may be distinct, indistinct, or invisible. The primaries may be mostly interrupted or all complete. There seems to be no change in proportions with age. Parker and Wettstein (1929) state that the premaxillary-maxillary teeth are 6–8 on a side; total 12 in the type.

Habits. Not known.

Remarks. The relationships of this set of species have been dealt with under *hardyi*. The two mainland forms occur together at Ypiranga, São Paulo, where *hardyi* has 96–100 primaries and *brasiliensis* has 122.

Specimens seen, 21, as follows:

	prim.	length	diam.	1/d
Santa Catharina:				
Colonia Hansa				
Hamburg 1807	124	213	5	43
Frankfort 2102, 1d	122	235	6.5	36
Joinville				
Vienna	124			
"	131			
Mus. Nac. Brazil 542	115	215	5	43 no eye
" " 840	125	235	6	39 no eye
São Paulo:				
Pernahyba				
Vienna	126			
"	127			
"	126			
Franca				
Mus. Paul. 960	130	217	6	36 prim. int.
Ypiranga				
Mus. Paul. 961	122♂	205	6	36 prim. comp.
Rio de Janeiro:				
Rio				
Paris 15 m.	120	190	4	47
Petropolis				
MCZ 24829	130	312	9	35
" 24826	129	167	5	33
South Brazil:				
Hamburg 1927	121	268	5	54
Hamburg 1927	121	268	7	39
" 1927	121	260	5	52
Brazil:				
Frankfort	121	265	8	44 eye indist.

	prim.	length	diam.	1/d
No locality:				
BMNH 98-6-27, 3	123	245	8	31
Vienna	122	247	6.5 eye invisible	38
Mus. Nac. Brazil 543	123	230	5 eye invisible	46

Ihering (1911) has recorded specimens in the Museu Paulista from Rio Fieo, São Paulo, and says it occurs in the State of Minas Geraes.

Note for identification: This animal has been confused with *Chthonerpeton viriparum* (q. v.). The Siphonops has: no inner mandibular teeth, the Chthonerpeton has 3–4; the tentacular aperture in the Siphonops is much closer to eye than to nostril, in the Chthonerpeton it is only slightly closer to eye than to nostril; the Siphonops has primaries 115–133, the Chthonerpeton has primaries 133–166; the Siphonops has a normal vent, the Chthonerpeton has a small sucking disk around the vent; the Siphonops is presumably oviparous, the Chthonerpeton is known to be viviparous.

Caecilia Linné

1758. *Caecilia* Linné, Syst. Nat. (10) **1**, p. 229 (included species *tentaculata* Linné and *glutinosa* Linné). Fitzinger (1843, Syst. Rept., p. 34) designated *C. lumbricoidea* [*lombricoidaea*] Daudin 1803 (=*C. gracilis* Shaw=*C. tentaculata* Linné in part) as type. Shaw in 1802 (Gen. Zool. **3**, 595) restricted *tentaculata* when describing *gracilis*, and I designate *tentaculata* Linné as restricted by him as type of *Caecilia*. Daudin's species was not in the content of the original genus.

1802. *Coccilia* Latreille, in Sonnini and Latreille, Hist. Rept. **4**, p. 237 (pro *Caecilia* Linné).

1901. *Amphiumophis* Werner, Abh. Mus. Dresden **9**, **2**, p. 14 (monotype *Amphiumophis andicola* Werner, l. c.).

Diagnosis. Caecilians without a tail; primaries 110–285; secondaries 0–94; scales usually present; 55–268 primary folds without secondaries; 1/d 26–160; snout projecting; tentacle in horseshoe-shaped groove on under surface of snout, below and slightly posterior to nostril; eye visible or invisible, in open orbit or roofed by bone; anterior teeth on both jaws enlarged, especially on lower; inner mandibular tooth row well developed to absent; length 126–1375 mm.; 16 forms.

Range. Coclé, Panamá, to Guayaquil, Ecuador, and Carabaya and Chanchomayo, Peru. The Guianas. Brazil. Sea level to 6200 feet.

Key to forms of Caecilia

A. Secondaries present.
  B. Primaries 110–150.
    C. Secondaries 38–83 ..... *dunni*
    CC. Secondaries 12–37 ..... *tentaculata*
  CCC. Secondaries 8 or less.
    D. Primaries 110–119 ..... *guntheri*
    DD. Primaries 139–150 ..... *abitaguae*
  BB. Primaries 154–285.
    C. Primary count minus secondary count plus 1/d ratio less than 282; primaries less than 239; 1/d ratio less than 94.
      D. No color markings.
        E. Secondaries 28–94.
          F. Primaries 185; 91 without secondaries ..... *armata*
          FF. Primaries 155–190; 108–138 without secondaries .. *nigricans*
          FFF. Primaries 187–238; at least 152 without secondaries *thompsoni*
        EE. Secondaries 8–25.
          F. Primaries 154–161 ..... *subnigricans*
          FF. Primaries 185–214 ..... *gracilis*
      DD. Color markings usually present.
        E. Eyes visible; usually a pair of yellow spots on each segment; primaries 154–199; secondaries 2–11 ..... *pachynema*
        EE. Eyes invisible; gray with black primary grooves; secondaries 7–29.
          F. Primaries 171–192 ..... *ochrocephala*
          FF. Primaries 204–209 ..... *polyzona*
    CC. Primary count minus secondary count plus 1/d ratio more than 291; primaries over 205; 1/d ratio usually over 100 ..... *bassleri*
AA. No secondaries.
  B. Primaries less than 200; eyes visible.
    C. Primaries less than 150.
      D. Primaries 110–119 ..... *guntheri*
      DD. Primaries 125–139 ..... *degenerata*
    DDD. Primaries 145–146 ..... *caribea*
    CC. Primaries 154–199 ..... *pachynema*
  BB. Primaries 226–231; eyes invisible ..... *elongata*

Tabular list of counts of Caecilia

Specimens seen	species	primaries	secondaries	primaries minus secondaries	1/d
4	guntheri	110–119	0–8	110–119	27–31
27	tentaculata	112–147	12–37	79–133	22–52
63	degenerata	125–139	0	125–139	31–76
19	dunni	123–150	38–83	55–85	32–57
2	caribea	145–146	0	145–146	53–55
3	abitaguae	139–150	5–6	134–144	43–59
2	subnigricans	154–161	17–18	137–143	58–62
1	armata	185	94	91	56
19	nigricans	155–190	28–62	108–138	37–66
25	pachynema	154–199	0–11	154–199	37–84
101	ochrocephala	171–192	7–29	149–179	39–87
31	gracilis	185–214	8–25	167–193	48–93
2	polyzona	204–209	10–17	187–199	43–61
10	thompsoni	187–238	29–41	152–200	45–92
3	elongata	226–231	0	226–231	83–89
12	bassleri	206–285	14–41	174–268	80–160
324					

Caecilia by areas

Caecilia of Panamá

		prim.	sec.	1/d
1	tentaculata	131	12	28
99	ochrocephala	171–192	9–29	39–87
3	elongata	226–231	0	83–89

Caecilia of Atrato drainage, Colombia

1	guntheri	119	0	29
2	dunni	132–133	50–61	32–35
1	nigricans	190	52	57
1	ochrocephala	185	23	50

Caecilia of Colombian Chocó

2	guntheri	110–115	0	27
15	dunni	128–150	50–83	37–57
7	nigricans	159–188	36–47	37–58

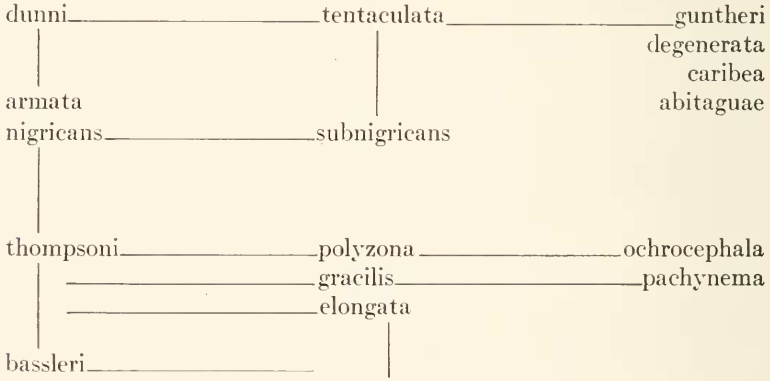
		prim.	sec.	1/d
	Caecilia of Pacific slope of Ecuador			
1	guntheri	118	8	31
1	dunni	123	38	41
9	nigricans	155–180	28–62	42–66
3	bassleri	206–251	14–32	119–130
12	pachynema	158–183	0–10	40–81
	Caecilia of the Cauca Valley, Colombia			
1	caribea	145	0	55
2	pachynema	159–166	2–7	52–78
2	polyzona	204–209	10–17	43–61
1	thompsoni (?)	212	35	84 (Rio Coqueta, Cauca Valley?)
	Caecilia of Magdalena Valley, Colombia			
2	subnigricans	154–161	17–18	58–62
6	thompsoni	187–238	29–39	45–92
	Caecilia of Barranquilla and Santa Marta region, Colombia			
2	tentaculata	116–147	14–21	31–38
1	caribea	146	0	63
	Caecilia of the Colombian Oriente			
51	degenerata	128–139	0	31–76
2	tentaculata	113–146	29–31	31
1	thompsoni (?)	212	35	84 (Rio Caqueta?)
1	bassleri	244	25	80
2	pachynema	156–180	0	38–54
	Caecilia of the Ecuadorian Oriente			
1	dunni	123	67	35
3	tentaculata	115–122	29–33	30–35
3	abitaguae	139–150	5–6	43–59
2	bassleri	254–271	28–41	124–160
1	pachynema	174	0	73
	Caecilia of the Peruvian Oriente			
2	tentaculata	120–129	28–31	36–39
1	gracilis	188	21	56
6	bassleri	230–285	17–30	80–124
4	pachynema	165–199	0–11	59–70

		prim.	sec.	1/d
		Caecilia of the Guianas		
13	tentaculata	112–146	13–37	27–52
25	gracilis	185–207	9–23	48–93
		Caecilia of Brazil		
1	tentaculata	130	15	46
1	armata	185	94	56
1	gracilis	214	25	92

This list by areas shows clearly that as many as five perfectly distinguishable forms may occur in a single geographical area. Colombia has twelve forms, Ecuador seven, Peru four, Panamá and Brazil three, and the Guianas two. No specimens of Caecilia have been seen or reported from Venezuela, but at least two (*tentaculata* and *gracilis*) must occur there.

Remarks. A diagram of the forms, with *dunni*, *nigricans*, and *armata*, *thompsoni*, and *bassleri* arranged in order of increasing number of primaries and increasing slimness, and with the other forms appended as they seem to fit, is given here as a possible scheme of relationships.

Two forms, *C. dunni* and *C. armata*, retain more of the scalation than do the others. *C. nigricans* is a close third. As *dunni* has a combination of few primaries and many secondaries it may be assumed to be the most primitive existing form. Other forms show: an increase in primaries; a decrease in secondaries; extreme attenuation; degeneration of the eye; a combination of these characters, and may be assumed to be more specialized.



The genus could, very plausibly, be regarded as monotypic with 16 races, so closely do allied forms resemble each other. But as many as five different forms may occur together and remain distinct, and at present it seems best to treat each recognizable form as a species. The difficulty of treating them in any other way may be illustrated by the fact that one can start with *nigricans* of the Chocó, and, by a series of easy transitions (via *subnigricans* of the Magdalena and *tentaculata* of the Oriente) arrive at *guntheri*, also of the Chocó. Also, in this set of forms, *dunni* is about as good an intermediate between *nigricans* and *tentaculata* and occurs with both, while *nigricans* itself is intermediate between the two forms of the Magdalena Valley, *subnigricans* and *thompsoni*. One could, perhaps consider *ochrocephala* and *polyzona* as races of a species, and the *guntheri-degenerata-abitaguae-caribea* set as races of another species.

Linné (1758) used the spelling Caecilia. The first occurrence of the emended spelling Coecilia that I have noted is Latreille (1802). There have been so many writings of the generic name in type which does not differentiate the diphthong "ae" from the diphthong "oe" that I have given up any attempt to differentiate between them in synonymies, and have used Caecilia throughout.

Cope, in 1885, put his *Caecilia ochrocephala* into the genus Herpele. I see no reason why *ochrocephala* should be placed in a different genus from *tentaculata* and *gracilis*. The West African *squalostoma*, the type of Herpele, has the tentacular aperture more posterior than any American species, and in it the anterior maxillary and dentary teeth are not enlarged. I do not consider *squalostoma* as congeneric with any American species.

The single specimen in Dresden upon which Werner, in 1901, founded his genus and species *Amphiumophis andicola*, is, in my opinion, conspecific with *Caecilia tentaculata*.

The following list contains described species which I think valid:

tentaculata Linné 1758.
gracilis Shaw 1802.
pachynema Günther 1859.
ochrocephala Cope 1866.
guntheri Peters 1879.
polyzona Fischer 1879.
nigricans Boulenger 1902.
thompsoni Boulenger 1902.
dunni Hershkovitz 1938.

I have examined the types of all of these except *tentaculata* and *gracilis*.

I have seen a specimen of *gracilis* which was so named by the describer of the species.

The following list contains described species which I regard as invalid. I have examined the types of all of these.

albiventris Daudin 1803 = *tentaculata.*
lombricoidaea Daudin 1803 = *gracilis.*
isthmica Cope 1877 = *tentaculata.*
buckleyi Boulenger 1884 = *pachynema.*
andicola Werner 1900 = *tentaculata.*
sabogae Barbour 1906 = *ochrocephala.*
intermedia Boulenger 1913 = *nigricans.*
palmeri Boulenger 1913 = *nigricans.*

The following names are substitutes:

ibiara Daudin 1803 for *tentaculata.*
vermiformis Gray 1850 for *gracilis.*

I describe hereinafter seven forms in addition to the nine recognized above as valid, making a total of 16 forms.

The most recent systematic treatment of these species is that of Nieden in "Gymnophiona" (1913). This is based on previous work by Boulenger. As my treatment differs very considerably, I should explain why. In the first place Boulenger was able to examine very little material aside from that in the British Museum. This contained, in 1929, 54 specimens of Caecilia, seven of them being the types of described forms; I have been able to examine 324 specimens and the types of 15 described forms. In the second place, Boulenger lumped primaries and secondaries together into one count, and thus a Caecilia with many vertebrae and few scales would appear statistically similar to one with few vertebrae and many scales. By keeping these two independent variables separate, I arrive at results which are frequently different from Boulenger's.

Caecilia dunni Hershkovitz

1913. *Caecilia intermedia* Boulenger (in part, numbers 5–6), Proc. Zool. Soc. London, p. 1020.
1913. *Caecilia nigricans* Boulenger, l. c., p. 1022 (not *C. nigricans* Boulenger 1902).
1938. *Caecilia dunni* Hershkovitz, Occ. Papers Mus. Zool. U. Michigan **370**, p. 2, f. 1.

Type. Mus. Zool. U. Michigan 82901, collected by Philip Hershkovitz, Dec. 1935.

Type locality. Near Tena, Province of Napo-Pastaza (Oriente) Ecuador, 1700 feet above sea level.

Range. Atrato Valley, Colombia; Colombian Chocó; Cachabé, northwest Ecuador; Tena, Ecuadorian Oriente. Sea level to 1700 feet.

Diagnosis. A Caecilia with 123-150 primaries; 38–83 secondaries; 55–85 primary folds without secondaries; 1/d 32/57; eye visible in most specimens; no markings; length 147–450 mm.

Description. The type has nine teeth in each of the long rows and two on each side in the inner mandibular row. The eye is invisible in the Cachabé specimen. There is some variation which may be geographic.

		Prim.	Sec.	1/d
1	E. Ecuador	123	67	35
1	N. W. Ecuador	123	38	41
15	Colombian Chocó	128–150	50–83	37–57
2	Atrato Valley	132–133	50–61	32–35

With more material the form might be divided.

Remarks. This form is allied only to *tentaculata*, from which it differs in having a higher secondary count. *C. tentaculata* is absent from the Pacific slope and from the Atrato Valley, but apparently occurs with *dunni* in the Oriente of Ecuador.

BMNH 1913–11–12, 134 from Peña Lisa was "taken from the stomach of a *Streptophorus atratus* swallowed by an *Elaps corallinus*" (Boulenger 1913).

Specimens seen 19, as follows:

Colombia:		prim.	sec.	length	diam.	1/d
Las Animas Cr., Quito R.,						
Atrato system, AMNH 13678		133	61/6	290	9	32
Quibdo on Atrato, Inst. La Salle		132	50	210	6	35
Anda Goya, BMNH 1915–10–21,	73	133	78/15	188	5	38
	74	136	80/11	210	5.5	38
	75	142	64	147	4	37
	76	139	63/20	435	8	54
	77	136	77/26	300	6	50
	78	—	———	—	—	—
	79	—	———	—	—	—
1916–4–25,	31	131	65/4	409	9	45
	32	134	77/11	375	9	41

Peña Lisa, Condoto, 300′,

		prim.	sec.	length	diam.	1/d
BMNH	1913–11–12,	134 146	67/8	280	6	56
		135 150	83/10	270	5	54
		136 147	62/8	395	7	57
	1914–5–21,	93 129	54/5	240	6	40
Condoto, BMNH	1910–7–11,	73 128	50/20	186	5	37
		74 146	78/21	350	5	50
Ecuador:						
Cachabé, BMNH	98–3–1,	36 123	38/6	290	7	41
Tena, U. Michigan	82901	123	67/5	450	13	35

Caecilia tentaculata Linné

1758. *Caecilia tentaculata* Linné (except reference to pl. 5, f. 2, Mus. Adolph, Frid.) Syst. Nat. (10), p. 229; Shaw 1802, Gen. Zool. **3**, 595; Latreille 1802, in Sonnini and Latreille, Hist Rept. **4**, p. 237, pl. 22, f. 2; Cuvier 1817, Regn. Anim. **2**, p. 87; Goldfuss 1820, Handb. Zool. **2**, p. 138; Merrem 1820, Vers. Syst. Amph., p. 168; Cuvier 1829, Regn. Anim. (2), **2**, p. 100; Gray 1831, in Griffith's Cuvier's Anim. King. **9**, App., p. 110; Gray 1850, Cat. Batr. Grad. Brit, Mus., p. 58; Peters 1879, Mon. Berlin Ak., p. 934, f. 5; Boulenger 1882, Cat., Batr. Grad. Brit. Mus. (2), p. 93; Boulenger 1895, Proc. Zool. Soc. London, p. 406; Phisalix 1912, Congr. Int. Zool. **8** (Graz 1910), pl. 4, f. 3, 8, 11 (integ.); Nieden 1913, Gymnophiona, p. 12, f. 3, 4, 10.

1838. *Caecilia lenticulata* Tschudi, Mem. Soc. Sci. Neufchatel **2**, p. 90 (typ. error)

1803. *Caecilia albiventris* Daudin, Nat. Hist. Rept. **7**, p. 423, pl. 92, f. 2 (Surinam, type Paris 9); Cuvier 1829, Regn. Anim. (2), **2**, p. 100; Gray 1831, in Griffith's Cuvier's Anim. King. **9**, App,, p. 119; Duméril and Bibron, 1841, Erp. Gen. **8**, p. 276, pl. 85, f. .3; Tschudi 1845, Faun. Peru. p. 80; Duméril 1863, Mem. Soc. Sci. Cherbourg **9**, p. 313, pl. 1, f. 1, 9.

1820. *Caecilia albiuentris* Merrem, Syst. Amph., p. 169 (emendation).

1803. *Caecilia ibiara* Daudin, Nat. Hist. Rept. **7**, p. 427 (substitute for *tentaculata* Linné).

1877. *Caecilia isthmica* Cope, Proc. Amer. Phil. Soc. **17**, p. 91 (Atlantic side isthmus of Darien, type USNM 25188); Dunn 1928, Proc. New England Zoöl. Club **10**, p. 73.

1900. *Amphiumophis andicola* Werner, Abh. Mus. Dresden (2), p. 14 (Chanchamayo, Peru, type Dresden 1689).

Type. Not known to exist.

Type locality. "America" = Surinam (cf. Amoen. Acad. 1, p. 498, pl. 17, f. 1, Linné, 1749).

Range. Darien to Brazil and to eastern Peru. Sea level to 2800 feet.

Diagnosis. A Caecilia with 112–147 primaries; 12–37 secondaries; 79–133 primary folds without secondaries; eye usually visible; 1/d 22–52; length 126–1075 mm.; belly usually with white blotches.

Description. Boulenger (1882) gives the dentition of the Shaw specimen as "teeth moderately large; on each side . . . . . maxillaries 6 to 8, vomero-palatines 5, outer mandibulars 6 or 7, inner mandibulars very small, few." The type of *andicola* has no inner mandibular teeth. The three specimens from Demarara and Mazaruni River have no visible eyes. White blotches are present on the bellies of most Guiana specimens irrespective of the primary count. The diagnosis above could have been made out entirely from Guiana specimens save for one more primary in a Colombian specimen, one less secondary in the type of *isthmica*, and for a stouter Ecuadorian specimen.

Remarks. Linné first mentioned this form in 1749 (Amoen. Acad. 1, p. 498, pl. 17, f. 1) as from Surinam and as having 135 rings. in 1754 (Mus. Adolph. Frid., p. 19) he abbreviates his 1749 description, and adds a figure (pl. 5, f. 2) of a much slimmer animal (*gracilis* of this paper). His 1758 description is very brief. In it he refers to his two previous papers, citing the former as page 489, a mistake that has been widely copied.

There is a rather wide range of variation, and possibly this species is composite, especially as the Guiana specimens are easily separable into two sets. I therefore list possible divisions.

1. low primary, low secondary, stout.				
	116	14	1/d 38	A single Colombian.
2. low primary, high secondary, stout.				
	112–129	24–37	22–39	This includes 19 specimens, 10 Guianan (type of *albiventris*), one Colombian, four Ecuadorian, two Peruvian (type of *andicola*), two without data.
3. high primary, low secondary, stout.				
	131–147	12–21	28–31	First numbers in each case are the Panamanian type of *isthmica*; second numbers a Colombian specimen.

4. high primary, low secondary, slim.

130–146	13–15	44–52	This includes three Guiana specimens and the Brazilian one. The type of *tentaculata* probably belonged here.

5. high primary, high secondary, slim.

146	29	40	A single Colombian specimen.

2 and 4 occur together in Guiana; 1 and 3 occur together in northern Colombia; 2 and 5 occur together in the Colombian Oriente. Additional material may in time afford some clarification of this puzzle, but I do not wish to divide the 27 specimens into five species under the existing conditions of knowledge.

The series as a whole has fewer secondaries than *dunni*, and more secondaries than the *guntheri-degenerata-caribea-abitaguae* series which, with *tentaculata*, comprise those Caecilia with less than 151 primaries. *C. tentaculata* occurs with *degenerata* at Garagoa in the Colombian Oriente, near *dunni* aod *abitaguae* in the Ecuadorian Oriente, and near *caribea* in northern Colombia.

Specimens seen, 27, as follows:

			prim.	sec.	length	diam.	1/d
Panamá:							
Atlantic side Darien							
	USNM	25188	131	12/0	570	20	28
Colombia:							
Rio Frio	MCZ	17376	147	21/0	330	8	31
Sabana arga	AMNH	14032	116	14	430	15	38
Garagoa	MCZ	17384	146	29/0	260	6.5	40
Pto. Asís, R. Putomayo							
Inst. La Salle			113	31/0	470	15	31
British Guiana:							
Marudi Mts.	AMNH	49470	121	37	126	4	31
		49471	121	26	145	5	29
		49472	120	33	135	5	27
		49473	120	34	140	5	28
		49474	119	34	128	4	32
		49475	115	29	442	13	34
do	do	49476	119	27	205	7	29
Demarara	BMNH						
	89-9-30,	16	136	13/3	313	6	52

			prim.	sec.	length	diam.	1/d
Kamakusa	AMNH	49962	112	33	500	15	33
Mazaruni R.	AMNH	20079	146	15/5	307	7	44
		20080	146	13/5	340	7	48
Dutch Guiana:							
Surinam	Paris	9	120	29	600	18	33
do	BMNH						
	58–6–1,	36	120	24/4	350	10	35
Brazil:							
No data	Hamburg	1717	130	15/8	502	11	46
Eastern Ecuador:							
Tuvola, 2800′	AMNH	23421	115	29/0	275	9	30
Copatava R.	AMNH	49961	122	29/2	640	18	35
Rio Suno 300′	Mich.		121	32/5	155	7	22
No data	Mich.	89459	121	33/4	1075	30	36
Eastern Peru:							
Chanchamayo	Dresden	1689	129	28/4	350	9	39
Monte Alegre, R. Pachitea							
750–1000′	AMNH	42855	120	31/2	365	10	36
South America:							
No data	Berlin	3901	115	31/4	565	15	37
No data:							
Shaw coll.	BMNH						
	1929–5–16,	1	114	28/4	510	19	27

Tschudi (1845) records *tentaculata* from Vitoc in middle Peru. He says that the young have gill slits.

The measurement of length in the giant Ecuadorian specimen is purely approximate. It could be stretched to 960 mm.; using a string it measured 1190 mm.

Caecilia degenerata spec. nov.

Type. MCZ 17384.

Type locality. Garagoa, eastern Colombia.

Range. Eastern Colombia.

Diagnosis. A Caecilia without secondaries; primaries 125–139; 1/d 31–76; length 132–555 mm.

Description. The primaries have been counted in 48 specimens. Of these 35 came from either Choachi or Tomaque, nearby localities in the

Oriente of Colombia. The range of these 35 is 128–139, and only three specimens are outside the range of 130–138. Specimens from elsewhere have similar counts except the Rio de Pache specimen with 125 primaries. The primaries are interrupted dorsally and ventrally (AMNH 22584–6, 22588–92).

The length-diameter ratio has been computed for 51 specimens. The range is 31–76 in 40 Choachi and Tomaque specimens. The larger animals seem to be slightly slimmer, since for the same 40 specimens the highest ratio below a length of 300 mm. is 45, and the lowest above a length of 400 mm. is 37. For these two places the four ratios above 60 are for animals of 362 mm. long and over, and the ratios below 35 are for animals of 300 mm. long and under. The Rio de Pache specimens is in contrast to this with a ratio of 31 (as stout as any) and a length of 525 mm.

The Rio de Pache specimen has yellow spotting laterally; 5–6 maxillary-premaxillary teeth on a side; 9 palatine teeth; 8 left mandibular teeth with the four first enlarged; 6 right mandibular teeth with the two first enlarged; 3–4 inner mandibular teeth; the eye definitely visible. A Choachi specimen has two inner mandibular teeth.

Remarks. The large series from Choachi and Tomaque, in the American Museum, gives the range of variation and the characters. The specimens from "Colombia," "Bogotá," and Garagoa are within this range of variation.

The specimen from Rio de Pache is so close in primary count that it is best placed here. I have not been able to place the locality. It was from one of Eigenmann's collections, and no data save "Rio de Pache, Porte" were with it. The University of Michigan staff, Dr. Barbour, Dr. Chapman, and myself, have been unable to find the Rio de Pache, Porte. Barbour suggested that it is Lima, near Peru, which would complicate the situation considerably.

Scales are definitely not present in the Garagoa specimen, the Rio de Pache specimen, AMNH 23355 from Colombia, the La Salle one from Choachi, and AMNH 23270 from Choachi. They are present in AMNH 23271 from Choachi.

Specimens seen, 63, as follows:

		prim.	length	diam.	l/d
Colombia:					
Choachi	AMNH 23259	131	384	9	42
	23260	132	326	9	36
	23261	133	400	10	40

			prim.	length	diam.	1/d
Choachi	AMNH	23262	—	398	8	50
		23263	136	425	8	54
		23264	—	—	—	—
"	"	23265	—	443	8	55
		23266	—	415	10	41
		23267	131	441	9	49
"	"	23268	—	378	9	42
		23269	—	—	—	—
Choachi	AMNH	23270	—	—	—	—
		23271	—	—	—	—
		23272	134	451	8	58
"	"	23273	138	367	10	37
		23274	131	360	10	36
Choachi, Inst. La Salle			135	390	8	49
Choachi and Tomaque	AMNH	22560	138	—	—	—
		22561	—	—	—	—
		22562	—	—	—	—
"	"	22563	139	512	11	46
		22564	133	550	13	42
		22565	—	—	—	—
"	"	22566	136	466	12	39
		22567	138	450	12	37
		22568	136	467	8	58
"	"	22569	—	406	9	45
		22570	130	380	8	47
		22571	136	433	8	54
"	"	22572	135	153	5	31
		22573	134	260	7	37
		22574	129	400	9	44
"	"	22575	130	321	8	40
		22576	137	455	6	76
		22577	130	132	4	33
"	"	22578	134	365	8	45
"	"	22579	135	213	6	35
		22580	—	420	7	60
		22581	131	408	8	51
		22582	—	—	—	—

			prim.	length	diam.	1/d
Choachi and Tomaque	AMNH	22583	136	182	4	45
		22584	134	380	10	38
		22585	134	300	9	33
		22586	135	485	8	60
		22587	134	154	4	38
		22588	128	445	9	49
		22589	132	362	6	60
		22590	138	555	10	55
		22591	138	555	10	55
		22592	130	350	10	35
Garagoa	MCZ	17383	134	470	10	47
? Bogotá	AMNH	23421	132	450	10	45
no locality	AMNH	23348	132	380	7	54
		23349	137	—	—	—
		23350	136	470	10	47
		23351	135	352	9	40
		23352	134	—	—	—
		23353	127	298	7	42
		23354	133	335	9	37
		23355	137	400	8	40
		23356	138	159	5	32
no locality	AMNH	34254	133	373	9	52
??? Rio de Pache, Porte	U. Mich.	65263	125	520	17	31

Caecilia abitaguae spec. nov.

Type. Mus. Univ. Michigan 89930.

Type locality. Abitagua, Oriente, Ecuador, 1100 m. elevation.

Range. Known only from type locality.

Diagnosis. A Caecilia with 139–150 primaries; secondaries 5–6; 1/d 43–59; length 300–1200 mm.; eye visible; no markings.

Description. Nothing of importance can be added to the diagnosis and the characters of the individual specimens.

Remarks. This form is close to *degenerata* of the Colombian Oriente, but these Ecuadorian specimens have a higher primary count, and all three have a few secondaries. It is also related to *C. guntheri* of western Ecuador, but has a much higher primary count, and is somewhat

slimmer. It is extremely similar to *C. caribea* of northern Colombia, differing only in having secondaries.

It occurs with *C. tentaculata* in the Oriente of Ecuador, but *tentaculata* has at least 17 fewer primaries and 23 more secondaries in the region where the two are together.

Specimens seen, 3, as follows:

Ecuador, Oriente:		prim.	sec.	length	diam.	1/d
Abitagua	Mich.	89929	150	6	1200	22	59
"	"	89930	145	6	780	18	55
"	Stanford	5061	139	5	300	8	43

Caecilia caribea spec. nov.

Type. MCZ 24520.

Type locality. Pensilvania (Cauca valley south of Medellin), Colombia.

Range. Known only from type locality and from Barranquilla, Colombia.

Diagnosis. A Caecilia with 145–146 primaries; no secondaries; eye visible; 1/d 53–55; no distinctive markings; length 390–585 mm.

Description. Nothing can be added to the diagnosis and the characters of the individual specimens.

Remarks. This form is similar to *degenerata* of the Colombian Oriente, to *abitaguae* of the Ecuadorian Oriente, and to *guntheri* of the Atrato valley and the Pacific coast. Strangely enough, it is most similar to *abitaguae*, differing only in lacking secondaries. It has a higher primary count than *degenerata* and a much higher one than *guntheri*.

C. caribea occurs with *C. tentaculata* in northern Colombia, but *tentaculata* there has 14–21 secondaries and a length-diameter ratio of 31–38.

Specimens seen, 2, as follows:

Colombia:			prim.	length	diam.	1/d
Pensilvania	MCZ	24520	145	390	7	55
Barranquilla	Senckenberg	3095a	146	585	11	53

Caecilia guntheri Peters

1859. *Caecilia rostrata* Günther, Proc. Zool. Soc. London, p. 417 (not *Caecilia rostrata* Cuvier = *Hypogeophis rostratus*).

1879. *Caecilia guntheri* Peters, Mon. Berlin Ak., p. 936 (substitute name).

1880. ?*Caecilia pachynema* Boulenger, Bull. Soc. Zool. France **5**, p. 48 (two specimens in Brussels from "Andes of Ecuador," not *C. pachynema* Günther).

1882. *Caecilia isthmica* Boulenger (at least in part) Cat. Batr. Grad. Brit. Mus. (2), p. 94, pl. 6, f. 1 (not *Caecilia isthmica* Cope); Boulenger 1895 Proc. Zool. Soc. London, p. 406; Boulenger 1913, Proc. Zool. Soc. London, p. 1020.

Type. BMNH 60–6–16, 58.

Type locality. West Ecuador.

Range. Western Ecuador and western Colombia. The Atrato Valley, Colombia.

Diagnosis. A Caecilia with primaries 110–119; secondaries 0–8; 1/d 27–31; eye visible; no markings; 260–630 mm.

Description. "Teeth moderately large, on each side. . . . . maxillaries 11, vomero-palatines 5, outer mandibulars 8; inner mandibulars very small, few" (Boulenger 1882). The Urrao specimen has 3 inner mandibular teeth. Mr. H. W. Parker kindly informs me that both the Peña Lisa specimens have scales; the Urrao specimen has none.

Remarks. The two Brussels specimens, first called *pachynema* and then *isthmica* by Boulenger, have not been seen by me. They are probably what is here called *güntheri*. They had 119 and 124 "circular folds." The largest was 750 mm. long. They had 6 maxillary, 6–7 palatine, and 5–7 mandibular teeth.

This species is close to *degenerata*, having fewer primaries, and to *tentaculata*, having fewer secondaries. It does not occur with either.

Specimens seen, 4, as follows:

	prim.	sec.	length	diam.	1/d
Colombia:					
Peña Lisa, Condoto					
BMNH 1913–11–12, 131	115	0	268	10	27
BMNH 1913–11–12, 132	110	0	330	12	27
Urrao on Atrato Inst. La Salle	119	0	260	9	29
West Ecuador:					
BMNH 60–6–16, 85	118	8	630	20	31

Caecilia subnigricans spec. nov.

Type. ANSP 4821.

Type locality. Magdalena River, Colombia.

Range. Known only from type locality.

Diagnosis. A Caecilia with 154–161 primaries; 17–18 secondaries; 137–143 primary folds without secondaries; eye visible; 1/d 58–62; length 350–370 mm.; no distinctive markings.

Description. Nothing can be added to the diagnosis.

Remarks. This form has fewer secondaries than *nigricans* and more primaries than *tentaculata*. It is anatomically between these two forms, neither of which occur in the Magdalena Valley, as *nigricans* is west of this area and *tentaculata* is east of it. It probably occupies the lower part of the valley, as the closely allied *thompsoni*, which has more primaries and more secondaries, is the only form known from the upper Magdalena.

Specimens seen, 2, as follows:

Colombia:			prim.	sec.	length	diam.	1/d
Magdalena River	ANSP	4921	161	18/8	370	6	62
"	"	4922	154	17/4	350	6	58

Caecilia armata spec. nov.

Type. Mus. Nac. Brazil 832.

Type locality. No data, probably Brazil.

Range. Unknown.

Diagnosis. A Caecilia with 185 primaries; 94 secondaries; 91 primary folds without secondaries; eye visible; 1/d 56; length 390 mm.; no color markings.

Description. It may be added to the diagnosis that the diameter is 7 mm., and that the last 12 of the secondaries are complete.

Remarks. This remarkable form has the hind half of the body with bony scales, and in that respect agrees with *dunni*. But the latter is a much shorter (123–150 primaries) form, and is usually stouter. In primary count and in proportions it falls close to *nigricans*, some specimens of which have the hind third of the body scaled. But *nigricans* has at most 62 secondaries and is a Pacific coast form, while *armata* may be presumed to be Brazilian. I offer the suggestion that the primitive scalation may have persisted at the eastern as well as the western periphery of the range of the genus. In this case the alliance might be

with another Brazilian Caecilia (*gracilis*), a species whose primary counts and proportions are also like those of *armata*. The only Brazilian *gracilis* has the highest secondary count (25) for that species.

It is a great pity that the specimen has no data, but its characters are such that it must be described as a new form.

Caecilia nigricans Boulenger

1902. *Caecilia nigricans* Boulenger, Ann. Mag. Nat. Hist. (7), **9**, p. 51; Nieden 1913, Gymnophiona, p. 13.

1913. *Caecilia intermedia* Boulenger (in part, numbers 1–4), Proc. Zool. Soc. London, p. 1026, f. 174 (St. Javier, N. W. Ecuador, type BMNH 1907–3–29, 69); Parker 1926, Ann. Mag. Nat. Hist. (9), **17**, p. 549.

1913. *Caecilia palmeri* Boulenger, l. c., p. 1021, f. 175 (Novita, Rio San Juan, Colombia, type BMNH 1910–7–11, 72).

Type. BMNH 1901–3–29, 88.

Type locality. Rio Lita, 3000 feet, N. W. Ecuador or S. W. Colombia [= Ecuador].

Range. West coast of Colombia; Atrato valley, Colombia; Gorgona I.; west coast of Ecuador.

Diagnosis. A Caecilia with primaries 155–190; secondaries 28–62; 108–138 primary folds without secondaries; eye visible; 1/d 37–66; length 147–950 mm.; no distinctive markings.

Description. The specimens are uniform blackish. Boulenger (1902) says the type had 8 maxillary and 6 mandibular teeth. He says (1913) of the type of *palmeri* "dentition as in *C. pachynema*," and of the type of *intermedia* "outer mandibular teeth . . . . . smaller than" *pachynema*, but his figures show larger teeth in *intermedia* than in *palmeri*. He also states that the snout of *palmeri* is like that of *pachynema*; and that of *intermedia* is more strongly projecting. His figures show *palmeri* with a more prominent snout than *intermedia*.

The intromittent organ of BMNH 1913–11–12, 133 is extruded and is "10 mm. in length and terminates in a four-lobed 'glans' " (Boulenger 1913).

Remarks. The male just mentioned was "swallowed by an *Elaps rosenbergii*."

The types of Boulenger's three species, which I think synonymous, have:

prim.	sec.	1/d	
168	47	65	*intermedia*
174	43	58	*palmeri*
177	32	60	*nigricans*

C. palmeri and *C. intermedia* were described in the same publication. The only differences in the descriptions refer to minor discrepancies in dentition and snout shape, and these are directly contradicted by the figures. No comparison with Boulenger's earlier *nigricans* was given.

This form of the Pacific coast differs from *subnigricans* of the Magdalena valley in the much higher secondary count. It differs from *thompsoni* of the upper Magdalena in lower primary and higher secondary counts; and from the more eastern *gracilis* in lower primary and higher secondary counts.

Specimens seen, 19, as follows:

		prim.	sec.	length	diam.	1/d
Colombia:						
Quesada River, Atrato valley						
AMNH 13679		190	52	850	15	57
Anda Goya						
BMNH 1916–4–25, 30		175	37/6	845	17	50♂
Novita, R. San Juan						
BMNH 1910–7–11, 72		174	43/6	700	12	58
Peña Lisa, Condoto						
	BMNH 1913–11–12, 133	174	47	720	14	51♂
" "	BMNH 1914–5–21, 91	159	40	625	11	57
" "	BMNH 1914–5–21, 92	171	——	—	—	——
Gorgona I.	BMNH 1926–1–20, 145	166	36/3	680	12.5	57
Chocó, Inst. La Salle		188	37/10	147	4	37
No locality	BMNH 1923–7–11, 72	174	43/6	600	12.5	48
"	Hamburg 384	172	33/0	638	11	58
Ecuador:						
Rio Lita	BMNH 1901–3–29, 88	177	32/7	600	10	60
Manabi	AMNH 3872	166	43/7	485	10	48
Salidero	Vienna	173	59/7	455	7	65
St. Javier	"	180	62/3	800	12	66
"	BMNH	168	47/8	950	17	65
Pambelar	"	168	28/8	705	11	64

			prim.	sec.	length	diam.	1/d
Paramba	BMNH		166	47/8	640	14	46
"	"		155	47/7	820	19	42
Plaza d'Oro, Santiago							
	USNM	20590	162	53/5	930	20	46

Caecilia thompsoni Boulenger

1899. *Caecilia gracilis* Cope, Sci. Bull. Philadelphia Commer. Mus. **1**, p. 8 (not *Caecilia gracilis* Shaw).

1902. *Caecilia thompsoni* Boulenger, Ann. Mag. Nat. Hist. (7), **10**, p. 152; Nieden 1913, Gymnophiona, p. 14.

Type. BMNH 1902–5–15, 26.

Type locality. Villeta [between Honda and Bogotá], 3500′, Colombia.

Range. Upper Magdalena valley and Rio Caquetá, Colombia.

Diagnosis. A Caecilia with primaries 188–238; secondaries 29–41; 152–200 primary folds without secondaries; 1/d 45–92; eye usually visible; no distinctive markings; length 345–1375 mm.

Description. MCZ 9726 has 8 maxillary, 4 outer mandibular and 2 inner mandibular teeth. Boulenger (1902) says the type had "teeth very large in front, 6 or 7 on a side in upper jaw, 15 or 16 in lower, 14 vomero-palatines on each side, 8 small inner mandibular teeth," and "blackish speckled with yellow on the sides." The eye is invisible in the specimen from Muzo.

Counts taken on specimens from definite Magdalena valley localities are altered by others as follows: the La Esperanza specimen raises the secondary count from 39 to 41, and lowers the difference between primary and secondary counts from 157 to 152; the Rio Caquetá specimen raises the 1/d ratio from 79 to 84, and the specimen reported as *gracilis* (AMNH 49976) from "probably near Bogotá" raises it to 92.

Remarks. In each individual respect my diagnosis of *thompsoni* overlaps my diagnosis of *bassleri*, but all the specimens can be allocated by combining characters. It is distinguished from *gracilis* by higher secondary count, and from *nigricans* by higher primary count.

Boulenger measured the type as 1170 mm., diameter 13. I measure it as 1000 mm., diameter 15. Cope measured AMNH 49976 as 1300 mm. I measure it as 1375 mm. This is the largest American Caecilian.

Specimens seen, 10, as follows:

Colombia:			prim.	sec.	length	diam.	1/d
Villeta	BMNH						
	1902–5–15, 26		192	29/0	1000	16	62
							TYPE

			prim.	sec.	length	diam.	1/d
Honda or Bogotá	MCZ	9726	188	29/8	670	15	45
Ibaque	MCZ	24522	207	39/7	370	6	62
Muzo	MCZ	24521	238	38/8	790	10	79
La Mesa near Bogotá,							
	Inst. La Salle		187	30/0	550	11	50
Bogotá ?	AMNH	49976	217	37	1375	15	92
Rio Caquetá	BMNH						
	1902–5–29, 179		212	35	760	9	84
no data	MCZ	24523	193	29/0	680	12	57
La Esperanza, Brussels			193	41/7	490	10	49
N. S. Amer.	Hamburg 1936		197	39	345	5.5	63

The British Museum Rio Caquetá specimen seems to be this species but has confusing locality data. Additional information gives "Cauca Valley, S. E. Colombia, collected by Dr. M. D. Eder, purchased through Rosenberg." The Rio Caquetá is in southeast Colombia, is a tributary of the Amazon, is not an unlikely place for *thompsoni* as it heads near the head of the Magdalena, but it is not in the Cauca valley.

The Cauca valley has a Rio Cóqueta, but this is in *northeast* Colombia, and is a very unlikely place for *thompsoni*.

Caecilia gracilis Shaw

1758. *Caecilia tentaculata* Linné (in part, the reference to pl. 5, f. 2, Mus. Adolph. Frid.) Syst. Nat. (10), p. 229.

1802. *Caecilia gracilis* Shaw, Gen. Zool. 3, **2**, p. 597; Gray 1850, Cat. Batr. Grad. Brit. Mus., p. 57; Dumeril 1863, Mem. Soc. Sci. Nat. Cherbourg **9**, p. 313; Peters 1879, Mon. Ak. Berlin, p. 935; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 75; Nieden 1913, Gymnophiona, p. 13.

1803. *Caecilia lombricoidaea* Daudin, Hist. Nat. Rept. **7**, p. 420, pl. 92, f. 2 (Surinam, types Paris 12); Dumeril and Bibron 1841, Erp. Gen. **8**, p. 275, pl. 85, f. 2.

1820. *Caecilia lumbricoides* Merrem, Vers. Syst. Amph., p. 168 (emendation); Cuvier 1829, Regn. Anim. (2), p. 100; Gray 1831, in Griffith's Cuvier's Anim. King. **9**, App., p. 110; Wiedersheim 1879, Anat. Gymn., pl. 2, f. 14, 19, 20, 22, pl. 6, f. 61, 65–7, pl. 7, f. 72–4, 76–9, 81, pl. 9, f. 89.

1820. *Caecilia lumbricoidea* Goldfuss, Handb. Zool. **2**, p. 138 (emendation); Wagler 1830, Nat. Syst. Amph., p. 198; Tschudi 1838, Mem. Soc. Sci. Neufchatel **2**, p. 90.

1850. *Caecilia vermiformis* Gray, Cat. Batr. Grad. Brit. Mus., p. 57 (MSS name of Shaw, quoted in synonymy of *C. gracilis*).

Type. Not known to exist. BMNH 1929–5–16, 2 is from the Shaw collection and was named by Dr. Shaw (Boulenger 1882, p. 75, spec. "g") but does not agree with Shaw's measurements, which were 13¾" long and ⅓" in diameter. Since no type was named this may be a cotype.

Type locality. "America."

Range. The Guianas; Para, Brazil; Iquitos, Peru. Sea level to 500 feet.

Diagnosis. A Caecilia with primaries 185–214; secondaries 8–25; 1/d 48–93; eyes usually visible; no markings; length 165–680 mm.

Description. The measurements show that this form becomes slimmer with age. BMNH 66–8–14, 341, the largest specimen, has the eye invisible but not covered by bone.

Data taken from Guianan specimens is altered by others as follows: The primary count is raised from 207 to 214 by the Para specimen, and the secondary count is raised by it from 23 to 25. The Vienna specimen from "S. Amer." lowers the secondary count from 9 to 8.

Remarks. The Guiana population to which the name *gracilis* applies is abundantly distinct from any other Guiana form, but is very confusingly allied to some of the western forms of the genus.

C. thompsoni of the upper Magdalena is larger, and has more secondaries, but the primary counts overlap those of *gracilis* in the range 188–214.

C. bassleri of Ecuador and Peru overlaps *gracilis* in all the numerical counts (primaries from 206 to 214, secondaries from 14 to 25, 1/d from 85 to 93). On combining characters, all specimens can be placed in one of the two forms. The two occur together at Iquitos, Peru.

C. pachynema of Ecuador and Peru overlaps *gracilis* in all the numerical counts (primaries 185–199, secondaries 8–11, 1/d 48–84). I have seen seven specimens within this range of overlap in all counts. These can only be allocated on the basis of color (when present in *pachynema*) and by locality.

C. polyzona of the Cauca Valley, has all its numerical counts within the range of those of *gracilis*. Specimens can be distinguished by color, by visibility of the eye, and by locality.

C. ochrocephala of Panamá and northwestern Colombia overlaps *gracilis* in all the numerical counts (primaries from 185 to 192, secondaries from 8 to 25, 1/d from 48 to 87). I have seen 26 specimens (8 *gracilis* and 18 *ochrocephala*) within this range of overlap in all counts. These specimens have been allocated by color, by visibility of the eye, and by locality.

Specimens seen, 31, as follows:			prim.	sec.	length	diam.	1/d
British Guiana:							
Dunoon	Michigan	47410	185	16	328	6	55
		47411	187	10	385	5	77
		47411	188	14	285	5	57
		47411	192	13	200	4	50
		47411	197	9	165	3	55
		52507	187	14	321	6	53
Wismar	Michigan	76676	189	10/3	295	4.5	66
Maccasseema	BMNH						
	87–1–22, 30		199	14/3	330	5	66
Demarara	"		—	—	—	—	—
No locality	USNM	58750	204	11/3	245	5	49
Oronoque R. Field		35116	198	16/5	278	3	93
Dutch Guiana:							
Surinam	ANS	4923	207	23/0	440	5	88
		4924	190	12/4	490	7	70
Surinam	BMNH						
	66–8–14, 341		195	22/9	680	11	62
	70–3–10, 58		203	16/6	444	5	89
	70–3–10, 60		202	17/5	472	6	79
"	Berlin	5826	199	15/2	367	4	92
	Vienna		200	—	165	3	55
	Munich		—	—	310	4	77
	MCZ	6637	201	22/0	370	7.5	48
	Paris	12	197	—	405	5	81
"	Paris	12	204	—	540	7	77
French Guiana:							
Cayenne	Paris	12b	—	—	—	—	—
"	"	12c	—	—	—	—	—
"Guiana":	Paris	12d	—	—	—	—	—
Brazil:							
Para	Vienna		214	25/6	370	4	92
Peru:							
Iquitos	AMNH	42851	188	21/8	390	7	56

			prim.	sec.	lgth.	diam.	1/d
South America:							
No locality	AMNH	23658	190	14/5	398	6	66
	BMNH						
	1929–5–16, 2		184	14/7	500	6	83
	Berlin	3700	197–	9/2	500	6	83
"	Vienna		198	8/4	420	5	84

CAECILIA BASSLERI spec. nov.

Type. MCZ 19401.

Type locality. Pastaza R., Ecuador (Canelos to Marañon).

Range. Eastern Colombia; eastern and western Ecuador, eastern Peru. Sea level to 500 feet.

Diagnosis. A Caecilia with primaries 206–285; secondaries 14–41; 1/d 80–160; 495–865 mm.; eyes visible or invisible.

Description. Uniform dark, head a little lighter. The eyes are invisible in AMNH 3874, in the Colombian specimen, and in MCZ 19401. Three have the 1/d below 105. A single specimen has the primary count below 227. The other eight have the 1/d over 104 (no other Caecilia has the 1/d over 93) and primaries over 226 (no other Caecilia has a primary count above 217, except the Panamanian *elongata* which has no secondaries and the Colombian *thompsoni*, which is stouter).

Remarks. Probably allied to *thompsoni* and to *gracilis*. Both *gracilis* and *bassleri* occur at Iquitos, Peru.

It is a pleasure to name this form, extreme alike in slimness and in number of vertebrae, for my friend Dr. Harvey Bassler, whose collection of Peruvian Caecilians included five of this species.

Specimens seen, 12, as follows:

			prim.	sec.	length	diam.	1/d
Western Ecuador:							
Rio Cayápas	AMNH	3874	206	32/13	725	6	121
St. Javier	BMNH						
	1901–3–29, 66		251	14/3	832	7	119
	BMNH						
	" 60–6–16, 86		227	14/4	650	5	130
No locality							
Eastern Ecuador:							
Rio Pastaza	MCZ	19401	271	41/8	800	5	160
Canelos	BMNH						
	80–12–8, 141		254	28/0	495	4	124

		prim.	sec.	length	diam.	1/d
Eastern Peru:						
Iquitos	AMNH 42852	285	17/0	865	7	124
Monte Carmelo, nr. Requena						
lower Ucayali	AMNH 45327	257	25	840	7	120
Pampa Hermosa, mouth of Cushabatay, Mid. Ucayali						
	AMNH 42840	230	28/9	630	6	105
	" 42841	232	30/6	655	6	109
Chaquimayo, Carabaya						
	BMNH 1908-3-11, 1	231	21/4	770	9	85
Mouth Rio Santiago						
	AMNH 42832	234	17	640	8	80
Eastern Colombia:						
Rio Putumayo, Punto Asïs						
	Inst. La Salle	244	25/6	800	10	80

Caecilia ochrocephala Cope

1866. *Caecilia ochrocephala* Cope, Proc. Acad. Nat. Sci. Philadelphia **18**, p. 132; Peters 1879, Mon. Ak. Berlin, p. 935; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 94; Brocchi 1883, Miss. Sci. Mex., Batr., p. 119, pl. 21, f. 1; Dunn 1931; Occ. Papers Boston Soc. Nat. Hist. **5**, p. 408.

1885. *Herpele ochrocephala* Cope, Proc. Amer. Phil. Soc. **22**, p. 171; 1885, Proc. Amer. Phil. Soc. **23**, p. 279; 1887, Bull. U. S. Nat. Mus. **32**, p. 9; Boulenger 1895, Proc. Zool. Soc. London, p. 409; Günther 1902, Biol. Centr. Amer., Rept., p. 307; Nieden 1913 (in part) Gymnophiona, p. 20; Dunn 1928, Proc. New England Zoöl. Club **10**, p. 73.

1876. *Caecilia gracilis* Garman, Proc. Boston. Soc. Nat. Hist. **18**, 412.

1906. *Caecilia sabogae* Barbour, Bull. Mus. Comp. Zoöl. **46**, p. 228 (Saboga Island, Panamá. Types MCZ 2425).

Type. USNM 29764, collected by Gallaer and LeConte.

Type locality. Atlantic side Isthmus of Darien.

Range. Province of Coclé, Panamá to Turbo, Colombia. Sea level to 2000 feet.

Diagnosis. A Caecilia with 171–192 primaries; 7–29 secondaries; 149–179 primary folds without secondaries; eyes invisible; pale gray, with black primary grooves; 1/d 39–87; length 151–610 mm.

Description. The eyes are invisible in all specimens seen. Nearly all specimens are colored as Cope described the type, "yellowish plumbeous. The plicae dark; head and throat ochre yellow." A specimen from Panamá Sabanas in the MCZ is pale and uniform; USNM 52486 from "Panamá" has paired light dorsolateral spots on each segment, thus resembling *C. pachynema* in color.

Outer mandibular teeth 8–9 on a side, inner 3–4, maxillary teeth 7–9 on a side; palatine teeth 10–13 on a side.

The range of variation in primary and secondary count found in 71 Canal Zone specimens is slightly exceeded by one from Cana which raises the primary count from 189 to 190; by one from San Miguel Island which raises the primary count to 192; by the type and the Cana specimen which raise the secondary count from 28 to 29.

Of 100 primary counts, 89 are from 174–188, six are below this range and five above. Of 98 secondary counts, 83 are from 10–25, seven are below this and eight above. Of 94 1/d ratios, 84 are from 41–65, four are 39–40, six (four in one lot and poorly preserved) are 66–87.

Remarks. C. ochrocephala has been taken in excavations on Barro Colorado Island at a depth of some ten feet below the surface.

In 1928 I reported finding eggs 3 mm. in diameter in a female, four on the right side and five on the left.

C. ochrocephala is similar to *C. polyzona* of the Cauca valley in color and in condition of the eye, but has a lower primary count.

C. ochrocephala is similar to *C. gracilis* of Guiana, Brazil and eastern Peru in numerical counts (8 *gracilis* and 18 *ochrocephala* fit in the region of overlap of the three counts), but differs in color and in condition of eye.

C. ochrocephala is also similar to *C. pachynema* of Colombia, Ecuador and Peru in numerical counts (6 *pachynema* and 19 *ochrocephala* fit in the region of overlapping of all three counts; primaries 171–192, secondaries 7–11, 1/d 40–84). It differs from *pachynema* in color (usually) and in condition of eye.

Specimens seen, 101, as follows:

Panamá Canal Zone:		prim.	sec.	length	diam.	1/d
Fort Sherman MCZ	9610	183	10/2	382	9	42
	10665	176	13/0	233	6	39
	10671	173	22/1	610	12	51
Cristobol Iowa State		174	15/0	250	5	50

			prim.	sec.	length	diam.	1/d
Gatun	AMNH	6644	178	21/4	414	7	59
	MCZ	9589	176	23/5	490	—	—
		9590	183	16/0	410	7	58♂
		9591	183	12/0	402	8	50
		9592	173	18/0	430	10	43
		9593	178	23/3	355	9	39
		9594	179	15/3	382	8	48
"	"	9595	181	29/3	325	7	46
San Pablo	MCZ	1306	183	24/4	242	5	48
"	AMNH	18670	184	10/0	310	6	51
Gorgona	MCZ	1493	175	23/3	375	7	53
Monte Lirio	MCZ	14816	171	20/2	515	10	51
Chagres River	MCZ	16289	182	26/4	285	6	64
Indio on Chagres							
	USNM	102850	184	16/4	211	4	53
Barro Colorado I.							
	MCZ	11855	173	18/2	375	7	53
		11856	172	23/2	310	7	44
Majagual	"	10672	174	20/2	382	7	54
		10673	175	25/5	244	6	41
		10674	179	25/5	328	7	47
Summit Lindsay coll.			—	—	—	—	—
Albrook Field E. R. Dunn coll.			185	17/0	261	6	43
			186	8/8	302	6	50
"	"		182	13/0	294	6	49
Corozal	Carnegie	8698	184	13/3	335	6	56
"	"	8699	179	10/0	340	7	49
"	MCZ	16290	185	12/3	370	7	53
"	"	16291	179	12/3	365	7	52
		16292	177	12/0	330	6	55
		16293	182	16/0	328	6	55
		16294	175	17/0	248	5	50
		16295	186	12/2	355	6	59
		16296	185	10/0	350	7	50
		16297	185	13/4	320	6	53
		16298	185	9/0	208	4	52
"	"	17888	184	9/0	390	8	49
Fort Clayton	USNM	65845	186	10/1	400	7	57
"	"	65846	181	28/1	390	7	56

			prim.	sec.	length	diam.	1/d
Fort Clayton	MCZ	14821	177	19/3	291	6	48
		14822	179	11/3	354	6	59
		14823	183	17/5	395	7	56
		14824	179	8/0	360	7	51
		14825	175	7/1	344	8	43
		14826	179	12/0	265	5	53
		14827	183	21/3	436	7.5	58
		14828	176	17/0	308	7	44
		14833	185	17/0	262	5	52
		14834	185	25/0	190	4	47
		14835	188	9/1	260	4	65
		14836	183	17/0	210	4	52
		14837	183	13/3	151	3	50
		14838	184	19/0	290	5	58
		15721	180	22/3	295	6	49
"	"	15722	184	24/5	258	5	52
Balboa Carnegie		8490	184	24/4	457	8	57♂
" "		8491	181	20/4	356	6	59
Ancon	MCZ	8600	173	14/0	545	12	45
		10675	178	19/2	382	7	54
		14817	189	27/5	525	8	66
		14818	180	17/4	435	5	87
		14819	178	20/3	472	7	67
Ancon	MCZ	14820	183	23/2	522	7	75
"	BMNH 1926-1-20, 72		177	16/3	350	7	50
Ancon or Balboa	MCZ	14829	183	25/4	420	10	42
Madden Dam	ANS	21825	185	16/3	325	5.5	59
		21826	183	26/4	335	5	67
"Canal Zone"	USNM	37857	189	17/2	428	7	61
		37858	182	11/3	407	8	51
Panamá							
Rio Grande to Rio Coclé, Prov. Coclé	MCZ		181	13/2	321	8	40
Nombre de Dios	MCZ	14832	182	10/0	290	7	41
Panamá City	"	4268	181	15/0	331	9	46
		15719	183	10/0	410	—	—
		15720	180	21/3	450	11	41

			prim.	sec.	length	diam.	1/d
Panamá-Sabanas	MCZ		177	10/0	370	9	44
			179	15/0	352	8	53
"	"		178	8/0	420	8	40
Saboga I.	"	2425	181	24/4	375	6	50
"	"	2425	181	11/3	—	—	—
San Miguel I.	"	2503	192	21/4	470	11	43
Caña, 2000′	USNM	50249	190	29/2	490	10	49
Atlantic side Darien							
	USNM	28185	180	10/2	420	6	70
"	USNM	29764	185	29/2	330	6.5	50
Darien Isthmus	Vienna		175	—	—	—	—
"	"		189	—	—	—	—
"Panamá"	Paris 7 alpha		184	21	—	—	—
	BMNH 87-12-12, 1		182	18/2	531	10	53
	BMNH 94-5-9, 6		185	21/4	450	9	50
	USNM	14116	181	20/5	428	8	53
	"	52495	187	27/3	550	10	55
	"	52496	185	12/4	505	11	46♂
	"	52497	180	18/5	480	9	53
	"		181	10/3	490	12	41
	MCZ	1521	187	23/0	535	10	53
	"	"	178	19/4	355	—	—
	ANS	4919	185	12/2	425	7	60
	MCZ	2502	185	20/7	432	7	61
Colombia:							
Turbo	MCZ	1492	185	23/3	355	7	50
"Brazil"	MCZ		188	10/0	495	9	55

Caecilia polyzona Fischer

1879. *Caecilia polyzona* Fischer, in Peters, Mon. Berlin Ak., p. 936; Fischer 1880, Arch. Naturg. **46**, **1**, p. 215, pl. 8, f. 1–4; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 94; 1895, Proc. Zool. Soc. London. p. 407.

1913. *Herpele ochrocephala* Nieden (in part), Gymnophinna, p. 20.

Type. Originally two specimens in the Berlin Museum, collected by Grosskopf. One is now AMNH 23449, the whereabouts of the other is not known.

Type locality. Caceres, Prov. Antioquia, Colombia.

Range. Cauca Valley, Colombia.

Diagnosis. A Caecilia with 204–209 primaries; 10–17 secondaries; 1/d 43–67; eyes invisible; "brownish gray, head little lighter, grooves black, light gray below"; length 560–670 mm.

Description. Fischer (1880) gives a count of the dentition which apparently includes the teeth of both sides; 22–25 maxillary; 20–22 vomerine; 20 outer mandibular; 10–12 inner mandibular. The missing type had 209 primaries, 10 secondaries, 1/d 59, and was 650 mm. long.

Remarks. C. polyzona is very close to *ochrocephala*, the only difference being the higher primary count.

Specimens seen, 2, as follows:

Colombia:			prim.	sec.	length	diam.	1/d
Cauca Valley	Vienna		204	17/0	560	13	43
Caceres	AMNH	23449	207	12	670	10	67

Caecilia pachynema Günther

1859. *Caecilia pachynema* Günther, Proc. Zool. Soc. London, p. 417; Cope 1868, Proc. Acad. Nat. Sci. Philadelphia, p. 118; Peters 1879, Mem. Ak. Berlin, p. 935; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 95, pl. 6, f. 2; 1895, Proc. Zool. Soc. London, p. 407; Nieden 1913, Gymnophiona, p. 13; Parker 1934, Ann. Mag. Nat. Hist. (10), **14**, p. 265.

1884. *Caecilia buckleyi* Boulenger, Ann. Mag. Nat. Hist. (5), **13**, p. 398 (Intac, Ecuador, type BMNH 78-1-25, 47); 1895, Proc. Zool. Soc. London, p. 407, pl. 23, f. 1; Nieden 1913, Gymnophiona, p. 13.

Type. BMNH 66-6-16, 87, collected by Fraser.

Type locality. Western Ecuador.

Range. Colombia; Ecuador; Peru. Sea level to 6200 feet.

Diagnosis. A Caecilia with primaries 154–199; secondaries 0–11; 1/d 38–84; eyes visible; usually with a lateral yellow spot on each segment; length 145–900 mm.

Description. MCZ 16288 has 6 maxillary teeth, 4 palatine teeth, 4 large mandibular teeth, and 1 inner mandibular tooth. Günther (1859)

says that the type has "5 hook-like teeth on each side, the anterior larger, three palatal teeth." Boulenger (1882) says of the same specimen "teeth large, few, widely separated; inner mandibulars very small few;, outer mandibulars very large, anterior largest, 5; maxillaries 6; vomeropalatines 9." Cope (1868) says that two specimens from Guayaquil had 8 maxillary teeth, 6 mandibulars, and 5 palatine. The type of *buckleyi* had (Boulenger 1884) "maxillary teeth large, 10 on each side. Vomeropalatines 8 on each side. Inner mandibulars small, few. Outer large—9 on each side."

All specimens with secondaries have scales. Those without secondaries have scales or lack them in about equal numbers (cf. Parker 1934).

No scales, 6: Zamora; type *pachynema*; type *buckleyi*; Normandia, Villavicencio; Medina Mts.

Scales, 4: Milligalli, Intac (2), Pallatanga.

Colombian specimens lower the Ecuadorian primary range from 160 to 159 and 154, and lower the 1/d ratio from 40 to 38; Peruvian specimens raise the Ecuadorian primary range from 192 to 194 and 199, and raise the Ecuadorian secondary count from 10 to 11.

The primaries are usually interrupted dorsally and ventrally. Most specimens have a large yellow spot on each side of each segment.

Remarks. Two specimens in the Berlin Museum (3716 and 3722) from Guayaquil are labeled as types of *C. guntheri* Peters. This is incorrect as the type of *guntheri* Peters (a substitute name for *C. rostrata* Günther, not *C. rostrata* Cuvier which is now called *Hypogeophis rostratus*) is BMNH 60–6–16, 85, the specimen erroneously called *C. rostrata* by Günther.

The type of *C. buckleyi* Boulenger seems to me a very young specimen of *pachynema,* which is stouter than larger individuals. A still smaller individual from Colombia is even stouter.

Specimens with primaries 185–199, secondaries 8–11, and 1/d 49–84 fit into the diagnostic counts of both *pachynema* and *gracilis*, and have been allocated by color and by locality.

Specimens with secondaries 7–11 agree in almost all counts with *ochrocephala.* These have been allocated on color, condition of eye, and locality.

This species occurs on both sides of the Andes, but is known to reach an altitude of 6200 feet at Milligalli (record altitude for an American Caecilian) and, if the Quito locality is correct, which I doubt, it reaches 9274 feet.

Specimens seen, 25, as follows:

			prim.	sec.	length	diam.	1/d
Colombia:							
Medellin	ANS	12980	159	2	519	10	52
	AMNH	49973	166	7	467	6	78
Villavicencio	Inst. La Salle		180	0	270	5	54
Medina Mts.	N. E. Villavicencio						
	AMNH	49959	156	0	145	4	38
No data	MCZ	16288	154	0	900	15	60
Ecuador:							
Guayaquil	Berlin	3716	168	0	468	7	66
	Berlin	3722	172	10/7	490	6	81
	USNM	12353	183	6/2	380	4.5	84
	BMNH						
	85–2–23, 15		172	8/4	380	6	63
Quito	Paris	11	181	5	780	11	71
Intac, 3000′	BMNH						
	78–1–25, 46		162	0	476	10	47
		47	181	0	160	4	40
	Michigan		158	8/0	750	12	63
	"		172	0	745	12	62
Milligalli, 6200′	BMNH						
	85–2–23, 14		164	0	820	12	68
Pallatanga, 5000′							
	AMNH	16986	160	0	630	12	52
Normandia, Zunia, Upana R.,							
1400–1800 m.	AMNH	23434	174	0	726	10	73
"Western Ec."	BMNH						
	66–6–16, 87		168	0	468	7	66
No data	Munich	148/1912	169	0	550	12	46
"	Vienna		192	10	375	6	62
Peru:							
No data	Vienna		169	11/0	415	7	59
"	"		194	0	410	6	68
"	"		199	0	385	6	64
"	ANS	16129	165	11/0	211	3	70
No data:	Smith College		190	2	485	8	60

Parker (1934) has recorded *pachynema* from Zamora, Ecuador, 3250 feet, a locality which is like Normandia, on the east face of the Andes.

Caecilia elongata spec. nov.

Type. Munich 1327/0.

Type locality. Panamá.

Range. Known only from Yavisa, Darien, Panamá.

Diagnosis. A Caecilia without secondaries; primaries 226–231; 1/d 83–89; no scales; eye invisible; no markings; 500–620 mm.

Remarks. The high primary count and the complete absence of secondaries render this form quite distinct. The head-and-neck from Yavisa looks quite different from *oehroeephala.*

Specimens seen, 3 ,as follows:

Panamá:		prim.	length	diam.	1/d
Yavisa	MCZ (head and neck only)	—	—	—	—
No locality	Munich 1327/0	226	620	7	89
"	" 1324/0	231	500	6	83

Chthonerpeton Peters

1879. *Chthonerpeton* Peters, Mon. Berlin Ak., p. 930, 940 (monotype *Siphonops indistinctus* Reinhardt and Lütken).

Diagnosis. Caecilians without secondaries or scales; no tail; tentacle in a horseshoe-shaped groove, on side of head between eye and nostril; eyes visible; two rows of teeth in lower jaw; anus usually a well developed sucking disk; primaries 76–166; 1/d 23–57; length 170–620 mm.; three species.

Range. Argentina, Uruguay and Brazil.

Key to species of Chthonerpeton

A. Primaries 76–87; (anal disk large; tentacle slightly nearer nostril than eye); Argentina, Uruguay, and southern Brazil . . . . . *indistinctum*

AA. Primaries 133–166.

B. Tentacle very close to nostril; anal disk medium; 145 primaries; upper Amazon . . . . . *petersi*

BB. Tentacle nearer eye than nostril; anal disk small; 133–166 primaries; southern Brazil . . . . . *viviparum.*

Remarks. In number of primaries and size of anal disk *indistinctum* is at one extreme of the genus and resembles the closely allied forms of

the more northern genus Typhlonectes. In position of the tentacle, however, *petersi* is extreme and in this character it is the closest to Typhlonectes.

I have examined 39 specimens, including the types of *viviparum* and *petersii*. I have not seen the type of *indistinctum*.

Chthonerpeton viviparum Parker and Wettstein

1907. *Siphonops braziliensis* (non Lütken) Vávra, Vesmír, Prag, **36**, 1, p. 11, f. 10 (not seen); Nieden 1913 (in part) Gymnophiona, p. 25.

1929. *Chthonerpeton viviparum* Parker and Wettstein, Ann. Mag. Nat. Hist. (10) **4**, p. 594.

Type. BMNH 1907-8-28, 1.

Type locality. State of Santa Catharina, Brazil.

Range. States of Santa Catharina and São Paulo, Brazil.

Diagnosis. A Chthonerpeton with 133–166 primaries; tentacle nearer eye than nostril; anal disk small; 1/d 36–57; 170–510 mm.

Description. (Original from type, eight from Joinville in Vienna Museum and one without data in Vienna. I have seen only the type) "primaries "143–144 and 147–149," "possibly . . . . . sexual . . . . . females . . . . . lower" [of my four additional one has 133 and one 166, so that the range is 133–166]; "largest 404, 339, and 333, mm., with diameters of 8, 8, and 7.5 mm. respectively; a half-grown specimen . . . . . 170 mm. . . . . diameter . . . . . 4, 5 mm." These figures indicate 1/d ratios of 51, 42, 44, and 36 respectively; the range of specimens I have seen being 37–57. Obviously the older are slimmer. "Tentacle . . . . . nearer the eye than the nostril, and a little below the straight line connecting these two"; "premaxilla and maxilla 12–13 a side; palatopterygoid 9–10 a side; mandible, outer row 11–12, inner row 3–4"; "greyish-olive with a purplish tinge"; embryo with a "single pair of plate-like gills which are closely apposed to the inner walls of the oviducts, no trace of an egg-capsule being found." "Each gill is, in reality, an oval plate lying parallel to the sagittal plane of the embryo, and connected to its neck by an exceedingly short peduncle which arises from the gill at a point rather dorsal and anterior to its geometric centre." Length of embryo 62 mm., diameter 2.5 mm., length of gill-plate 14 mm.

Remarks. Siphonops brasiliensis occurs with this form in the state of Santa Catharina, Brazil, and the two animals have been confused by

Vávra, by Nieden and by me. The Hamburg specimen was actually in my notes as the Siphonops. Except for one specimen of each form (with 133 primaries) the Siphonops has fewer primaries and the Chthonerpeton has more. The skull and the dentition afford perfectly diagnostic characters, and the anal disk of the Chthonerpeton is usually distinct enough.

Specimens seen, 5, as follows:

			prim.	length	diam.	1/d
Brazil:						
São Paulo:						
Franca	Mus. Paul.	950	133	380	8	47
Santa Catharina:						
Joinville	MCZ 24593		166	510	9	57
No locality	Mus. Nac. Braz.	829	144	215	5	43
"	Hamburg 1937		148	355	8	44
"	BMNH 1907–8–21, 1		144	335	9	37

Chthonerpeton petersii Boulenger

1882. *Chthonerpeton petersii* Boulenger, Cat. Batr. Brit. Mus. (2), p. 104, pl. 9, f. 2; 1895, Proc. Zool. Soc. London, p. 411; Nieden 1913, Gymnophiona, p. 24.

Type. BMNH 51–9–2–6.

Type locality. Upper Amazon.

Range. Known only from type locality.

Diagnosis. A Chthonerpeton with 145 primaries; 1/d 39; tentacle much closer to nostril than eye.

Description. I see no reason to alter Boulenger's original description, which follows. "Teeth small, numerous, subequal. Snout rounded, moderately prominent; eyes not distinct through the skin; tentacle close to and behind the nostril. Body elongate; 145 circular folds, complete except the anterior 28, which are interrupted on the dorsal and ventral line. Tail indistinct, rounded. Uniform dark olive-grey, the eyes indicated by a whitish spot. Total length 620 millim.; greatest diameter of body 16 millim." "Anus largish, but smaller than in *indistinctum*." (Parker, in litt.)

Specimens seen, 1, the type.

Chthonerpeton indistinctum (Reinhardt and Lütken)

1861. *Siphonops indistinctus* Reinhardt and Lütken, Vid. Meddel. Kjobenhavn, p. 203; Duméril 1863, Mem. Soc. Sci. Nat. Cherbourg, p. 318, p. 1, f. 3; Wiedersheim 1879, Anat. Gymnophiona, pl. 2, f. 13, 15, 16, pl. 6, f. 68, pl. 9, f. 84–7.

1879. *Chthonerpeton indistinctum* Peters, Mon. Ak. Berlin, p. 929, 940, f. 9; Boulenger 1882, Cat. Batr. Brit. Mus. (2), p. 104; Cope 1889, Bull. USNM **34**, pl. 11, f. 1–6; Boulenger 1895, Proc. Zool. Soc. London, p. 411; Ihering 1911, Rev. Mus. Paulista, p. 107; Nieden 1913, Gymnophiona, p. 24, f. 8; Procter, 1923. Ann. Mag. Nat. Hist. (9), **11**, p. 230; Gliesch 1929, Blätt. Aqua. Terr. **40**, **13**, p. 229, pl. 31; Gaggero 1934, Prelim. Ann. Mus. La Plata **3**, **1**, p. 173.

Type. In Copenhagen Museum. Not seen. Collected by Prof. Kroyer of the frigate Bellona.

Type locality. Buenos Aires, Argentina.

Range. Argentina (Buenos Aires), Uruguay, Southern Brazil as far as Paraná.

Diagnosis. A Chthonerpeton with 76–87 primaries; 1/d 20–45; anus much enlarged; tentacle slightly nearer nostril than eye; length 119–593 mm.

Description. Primaries 76–87; only three out of 27 specimens over 83; primaries indistinct and incomplete, distinct only on belly; tentacle a flap in a horseshoe-shaped groove, posterior to nostril, nearer to it than to eye (not so close to nostril as in *petersii*); uniform dark in color; anus in a large sucking disk; length from 119–593 mm.; no apparent change in length-diameter ratio with increase in size. A single 405 mm. specimen has 1/d 45; 20 others have 23–36. Uniform dark in color. According to Peters (1879) and Wiedersheim (1879) the teeth are as follows: vomerine 5–3; palatine 8–5; premaxillary 5–6; maxillary 9–8; mandibular, 13 outer and 4 inner. Argentine specimens (10) have 76–81 primaries (the type had 78); specimens from Brazil and Uruguay (12) have 76–87.

Habits. Peters (1879) speaks of its being taken from "deep in the earth"; while Gleisch (1929) tells of a 405 mm. specimen in Porto Alegre, during a rain, being on the surface, apparently in a gutter, and noticed the enlarged anal disk functioning as a holdfast or sucker.

Remarks. This, the most common and best known of the species, is in some ways the most extreme. Reinhardt and Lütken, in the original description, mention a specimen in the Paris Museum, from Brazil, which they considered this species. They also had one from Buenos

Aires with 78 primaries. The Paris specimen was said to have 100 primaries, and to this day *indistinctum* is always said to have 78–100 primaries. I found two specimens in Paris labeled *Cthonerpeton indistinctum;* Paris 17, Brazil, primaries 91 or 92, length 261 mm., diameter 6 mm., 1/d 43; and Paris 17a, Buenos Aires, primaries 78. Paris 17 is, I imagine, the specimen referred to by Reinhardt and Lütken. It is a young *Siphonops annulatus,* very dry, and with the tentacle much further from the eye than usual in that species, and I imagine that it was this feature which misled Reinhardt and Lütken. Duméril (1863) counted 98 primaries and mentions the white grooves and the tentacle position.

Specimens seen, 33, as follows:

		prim.	length	diam.	1/d
Argentina					
Southern Argent.	Munich	81	593	20	30
Buenos Aires	Paris 17a	78	405	9	45
" "	AMNH 11949	79	251	9	28
" "	Frankfort 2104a	81	430	15	29
No locality	Mus. Paul. 959	78	317	10	32
	" " 959a	77	247	9	27
	Berlin 26340	78	—	—	—
	Berlin 26340	76	—	—	—
	" "	—	119	4	30
	" "	—	—	—	—
	AMNH 23508	80	188	5.5	34
Isla Ella, R. Paraná	BMNH 1926–5–29–17	80	—	—	—
Uruguay:					
Durazno	USNM 65538	78	240	9	27
Brazil:					
Rio Grande do Sul					
Porto Alegre	Berlin 9559	80	355	13	27
" "	" 6803	80	160	6	27
" "	" "	—	160	5	32
" "	" "	86	210	7	30
" "	" "	80	330	11	30
" "	BMNH 83–1–19–2	83	189	6	31
" "	AMNH 23507	76	163	4.5	36
Camaquam R.	BMNH 89–8–24–4	87	365	14	26

		prim.	length	diam.	1/d
No locality	AMNH 23506	77	165	6	27
"	Berlin 10458	79	165	7	24
"	" "	80	270	9	30
"	MCZ 1501	76	260	11	24
Santa Catharina	Hamburg 5	82	390	13	30
Joinville Mus. Nac.	844	82	300	13	23
Paraná " "	846	83	300	13	23
Castro Tibeira, Rio Paraná	BMNH 1922–11–23–10	(head only)			
No state or locality	Berlin 16445	—	—	—	—
	" "	—	—	—	—
"Central America"	Hamburg 1715	76	278	11	25
No data	ANS 13948	76	205	9	23

Gaggero (1934) has recorded it from the mouth of the Rio Santiago, Argentina.

Procter (1923) states that the Castro Tibeira specimen was taken from the belly of a *Sorellina brandon-jonesii*.

Typhlonectes Peters

1879. *Typhlonectes* Peters, Mon. Berlin Ak., p. 930, 941 (type *compressicauda*).
1912. *Thyphlonectes* Peracca, Mém. Soc. Sci. Neufchatel, **5**, p. 111.

Note. I hereby designate *Caecilia compressicauda* Duméril and Bibron as the type of Typhlonectes Peters. The genus as originally described contained *compressicauda*, *dorsalis*, *natans*, and, with a query, *syntremus*.

Diagnosis. Caecilians without scales or secondaries; primaries poorly developed; eyes visible; two rows of teeth in lower jaw; no tail; anus in a well developed sucking disk; tentacle in a horseshoe-shaped groove, on side of head very close to and posterior to nostril; laterally flattened with a dorsal keel and fin in the posterior part of body; aquatic; primaries 77–105; 1/d 12–41; length 140–695 mm.; two species; three forms.

Range. Colombia, Venezuela, Guiana, Brazil; Atrato, Magdalena, Orinoco and Amazon systems.

Key to forms of Typhlonectes

A. Somewhat compressed; dorsal fin restricted to posterior; head large.
  B. Primaries 77–87; Guiana and Brazil ..... *compressicauda compressicauda*
  BB. Primaries 86–105; Venezuela and Colombia ..... *compressicauda natans*
AA. Extremely compressed; dorsal fin nearly to head; head small; primaries 88–104; Venezuela, Guiana, and Brazil ..... *kaupii*

Remarks. The genus is very close to Chthonerpeton. Among the forms, *kaupii* is decidedly the most specialized.

I have examined 58 specimens, including types of *compressicauda*, *natans*, *venezuelense*, and *dorsalis*. I have not seen the type of *kaupii*, or of *microcephala*.

Typhlonectes compressicauda compressicauda (Duméril and Bibron)

1841. *Caecilia compressicauda* Duméril and Bibron, Erp. Gen. **8**, p. 278; Gray 1850, Cat. Batr. Grad. Brit. Mus. p. 57; Duméril 1863, Mem. Soc. Sci. Nat. Cherbourg **9**, p. 316; Peters 1874, Mon. Berlin Ak., p. 45 (habits); 1875 idem, p. 683, f. 1–4 (habits).

1879. *Typhlonectes compressicauda* Peters, idem, p. 941, f. 11; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 102; Sarasin and Sarasin 1887, Ergeb. Forsch. Ceylon, **2**, p. 26, fig.; Boulenger 1895, Proc. Zool. Soc. London, p. 4111; Nieden 1913, Gymnophiona, p. 22, f. 16.

1912. *Thyphlonectes compressicauda* Fuhrmann, Mem. Soc. Sci. Neufchatel, **5**, p. 119, f. 4.

Type. Paris 18.

Type locality. Cayenne.

Range. British Guiana to Para, Rio Purus, and Rio Solimoes.

Diagnosis. A Typhlonectes with fin in posterior third of body; primaries 77–87; 1/d 12–24; length 148–515 mm.

Description. In general the larger specimens seem to be slimmer, but in these more or less flattened forms the length-diameter ratio is very uncertain. Only two specimens have the primaries below 83. Secondaries have been recorded by Fuhrmann (1912) on material which I have not seen. In this species, and still more in *natans*, the primaries are

very hard to count, and indistinct. At the same time adventitious folds appear and are liable to be taken for primaries or secondaries or both. The primaries are all incomplete on the back, and no true secondaries are present. The color is uniform blackish.

Habits. Peters (1874) states from a communication of Jelski that an adult female was taken in a fishing net in the Kaw river, eastern Guiana. Between the river and the house she gave birth to a single young. She was immediately killed, and five more young were found in the oviducts. The mother measures 500 mm., the young one was 157 mm. long, and an embryo measured 136 mm. No gill slits were observed, but there were two large, flattened, allantoic gills which measured 55 mm. Peters (1875) figures one of these, and so do the Sarasins (1887).

A specimen in the American Museum, from Manáos, was found "in a dead log come up out of the water."

Remarks. This beast is closely related to *natans*. The ranges are adjacent, and the relationship so close that I regard the two as races. Fuhrmann (1912) came to the conclusion that Guiana *compressicauda* and Venezuelan animals were racially different, since according to him a specimen from Guiana had 84 primaries, and two Venezuelan specimens had 94 and 95 primaries. He therefore called the Venezuelan form *Typhlonectes compressicauda venezuelense*. His primary count for this form does not differentiate it from *natans*, for which he himself gives 90–95. He regarded the difference between *compressicauda* and *natans* to be the higher head and close approximation of nostril and tentacle in *compressicauda*, as against the flatter head and less approximated tentacle and nostril of *natans*. These differences are scarcely appreciable, although Fuhrmann figures them. His figure of *venezuelense*, furthermore, shows a quite intermediate condition in these two respects between his figures of *compressicauda* and of *natans*. I regard the primary count as of more importance, and judged by that criterion, *venezuelense* is indistinguishable from *natans*.

Specimens seen, 17, as follows:

		prim.	length	diam.	l/d
British Guiana:					
Harauruni Cr., Demarara R.					
U. Mich. 82854		? 79	—	—	—
French Guiana:					
Kaw River	Berlin 8170	—	157	10	16 larva

		prim.	lgth.	diam.	1/d
No data	Paris 18	83	—	—	—
	18	—	—	—	— TYPE
	18	84	150	9	15 TYPE
	18a	83	455	20	23
No locality	Vienna	85	148	—	—
Brazil:					
Para	MCZ 289	85	495	25	20
Monte Alegre, Grande Para					
	BMNH 1926-10-28-7	84	375	23	16
" "	BMNH 1926-10-28-7	—	175	15	12
Manáos	AMNH 12979	87	—	19	—
"	BMNH 93-4-24-2	84	515	24	21
"	" 1913-3-11-1	84	215	10	21
"	" 1916-4-12-1	77?	—	—	—
"	" 1916-4-12-2	85	391	27	14
Ayapua, Rio Purus	Berlin 31991a	86	345	20	17
Solimoes, Amazonas	Berlin 30991b	—	435	18	24

Typhlonectes compressicauda natans (Fischer)

1879. *Caecilia natans* Fischer, in Peters, Mon. Berlin Ak., p. 941; 1880 Arch. Naturg. **46**, **1**, p. 217, pl. 8, f. 5–7.

1879. *Typhlonectes natans* Peters, loc. cit., p. 941; Boulenger 1882, Cat. Batr. Grad. Brit. Mus. (2), p. 103, pl. 9, f. 3; 1895, Proc. Zool. Soc. London p. 411; Nieden 1913, Gymnophiona, p. 23, f. 17; Heimroth 1915, Blätt. Aqua. Terr. **26**, p. 34 (habits).

1912. *Thyphlonectes natans* Peracca, Mém. Soc. Sci. Neufchatel, **5**, p. 111; Fuhrmann 1912, t. c., p. 113, f. 1–3.

1888. *Typhlonectes compressicaudus* Cope, Journ. Morph. **2**, **2**, 1889, pl. 22, f. 5 (otic region); 1889, Bull. U. S. Nat. Mus. **34**, pl. 51, f. 20 (hyoid).

1912. *Thyphlonectes compressicauda venezuelense* Fuhrmann, loc. cit., p. 124. f. 5–6 (Maracaibo, Venezuela, COTYPE Hamburg 823).

Types. Berlin 9522–3, 3772; AMNH 23486; BMNH 81–4–9, 5.

Type locality. Cauca R., Colombia.

Range. Colombia, Venezuela, Trinidad.

Diagnosis. A Typhlonectes with dorsal fin in posterior part of body; primaries 86–105, incomplete; 1/d 15–41; length 140–615.

Description. Only a single specimen out of 18 has the primaries above the range of 86–97. Peters and Fuhrmann have both counted secondaries in this form. I have been unable to make any out. There is no clear indication of any change of proportions with age. I find four inner mandibular teeth in U. Mich. 60881. Fischer (1880) gives for this row 14, and for the outer mandibular 38, for the maxillary 40–42, and for the vomerine 34–36. These are total counts, and the Michigan specimen then has 8 inner mandibular teeth as against 14 in the type.

The color is rather uniformly dark. Fischer says a little lighter below. The anal disk is white. Its diameter in the two types was 7 and 6 mm. respectively.

Habits. The types were taken by fishing. A specimen from Quesada R. was "floundering in test pit." Peracca (1914) says "caught on a line at Puerto Berrio in the Magdalena." Heimroth (1915) says he received a 480 mm. female July 14, 1914. On Jan. 16, 1915, four young were born to her. They measured 190–200 mm. and had no sign of gills. MCZ 24525 is 140 mm. long. It has no sign of gills or gill slits.

Remarks. The relationship of *natans* to *compressicauda*, and the status of *venezuelense* as a synonym of *natans* have been dealt with under *compressicauda*. The Bogotá specimens must be mislabelled.

Specimens seen, 22, as follows:

Colombia:			prim.	lgth.	diam.	1/d
Caceres	BMNH	81–4–9, 5	—	369	11	33 TYPE
"	Berlin	9522	93	462	15	30 TYPE
"	"	3772	90	475	25	19 TYPE
"	AMNH	23496	94	511	18	28 TYPE
Cauca	Berlin	9523	103	525	15	35 TYPE
Cauca R., W. of Medellin						
	Inst. La Salle		88	410	10	41
Honda	AMNH	22592	89	485	18	27
"	MCZ	9316	92	325	12	27
Medellin	AMNH	12978	96	540	25	22
Cúcuta	MCZ	24524	91	580	30	19
"	MCZ	24525	92	140	8	17
Bogotá (?)	AMNH	23418	86	440	14	31
"	"	23419	—	470	15	31
"	"	23420	—	445	18	25

			prim.	lgth.	diam.	1/d
Quesada R., Atrato R.						
	AMNH	49978	90	440	18	24
Sopleviento	U. Mich.	60881	87	310	20	15
"	"	"	88	250	14	18
"	"	"	86	285	14	20
Barranquilla	Hamburg	335	87	285	13	22
Venezuela:						
Maracaibo	Hamburg	823	97	345	15	23
				COTYPE *venezuelense*		
Trinidad:						
————	Dresden	639				
South America:						
————	Vienna		105	615	23	26
"Belize"	USMN	30534	92	325	12	27

It has been reported from Puerto Berrio, on the Magdalena, by Peracca (1914).

Typhlonectes kaupii (Berthold)

1859. *Caecilia Kaupii* Berthold, Nachr. Ges. Göttingen, p. 181.
1867. *Siphonops Kaupii* Keferstein, idem, p. 361.
1891. *Typhlonectes kaupii* Boulenger, Ann. Mag. Nat. Hist. (6), **8**, p. 457; 1895, Proc. Zool. Soc. London, p. 411; Nieden 1913, Gymnophiona, p. 23.
1877. *Caecilia dorsalis* Peters, Mon. Ak. Berlin, p. 459, f. 1–3 (Angostura, Ciudad Bolivar, Venezuela).
1879. *Typhlonectes dorsalis* Peters, Mon. Ak. Berlin, p. 941; Boulenger, Cat. Batr. Grad. Brit. Mus. (2), p. 103.
1912. *Thyphlonectes dorsalis* Fuhrmann, Mem. Soc. Sci. Neufchatel **5**, p. 124, f. 7.
1937. *Chthonerpeton microcephalum* Miranda Ribeiro, O Campo, May, p. 66.

Type. Not seen; in Göttingen Museum.

Type locality. Angostura, Venezuela [now Ciudad Bolivar].

Range. Venezuela to Brazil and Peru; specifically, from Ciudad Bolivar to Para, Matto Grosso, Iquitos, and middle Ucayali.

Diagnosis. A Typhlonectes with dorsal fin almost to head; head very small; tentacle close behind nostril; anal disk very large; primaries 88–104.

Description. No trace of secondaries; primaries 88–104, all complete; eye visible; dorsal fin or keel beginning on the neck; body very com-

pressed posteriorly; anus in the hinder part of a large sucking disk (much larger than head in ANS 4926; 5½ mm. in Berlin 10104); 1/d difficult to measure, approximately 20–36; smallest seen 167 mm. long; largest 695 mm. long; light brown, primaries blackish.

Habits. The specimen from Manáos was taken "under stones in 4 inches of water near rock ledge of river." That from Belém was from "docks in river."

Remarks. This is the most specialized of the group in compression of body, extent of fin, and size of anal disk. The complete folds seem more primitive than those of the others, but in all other ways it is much the most specialized. The type of *kaupii* had 104 primaries, two more than any I have seen.

Specimens seen, 19, as follows:

			prim.	length	diam.	1/d
Venezuela:						
Ciudad Bolivar	Berlin	10104	96	600	25	24
					TYPE *dorsalis*?	
" "	Hamburg	336	(head only)			
Angostura	Berlin	9092	102	270	8	35
					TYPE *dorsalis*?	
Orinocó R.	Hamburg	489	101	420	?	?
Guiana:						
————	ANS	4927	98	300	15	20
Brazil:						
Para	Hamburg	1928	98	335	13	25
Para, Belém	Carnegie	2908	92	410	7–14	28
R. Negro, Manáos	"	2906	88	172	6	28
"Brazil"	Vienna		?	480	?	?
"	ANS	4926	92	405	14	29
No locality	BMNH	98–10–17–7	93	167	6	28
" "	"	98–10–17–8	96	260	11	24
Peru:						
R. Ampiyacu, near Pebas						
	USNM	101105	95	425	16	27
Iquitos	AMNH	42853	99	545	15	36
"	AMNH	42854	98	545	19	29
San Antonio, Rio Itaya						
	AMNH	42857	96	695	20	35
Rio Pisqui (mid. Ucayali)						
	AMNH	42856	98	505	14	36

No locality:	prim.	lgth.	diam.	1/d
BMNH 98-10-17, 7	93	167	6	28
" 98-10-17, 8	96	260	11	24

Note. Peters (1877) gives 99 primaries for the type of *dorsalis*, and says it was 265 mm. long, diameter 7 mm. This fits pretty well to my count and measurements for Berlin 9092 and would seem to make that specimen the type were it not that Berlin 10104 is labeled "type." Probably it is best to regard them as cotypes.

Dr. Joseph Bailey very kindly furnished me with a copy of the description of *Chthonerpeton microcephalum* Miranda Ribeiro, and having examined the type, wrote me that it was a Typhlonectes. The description fully confirms this and indicates 92 primaries, a length of 560 mm., a diameter of 23 mm., and a length/diameter ratio of 24. These counts fall within the known variation of *kaupii*. The description mentions the small head, the complete dorsal fin fold, and the very large anal disk.

The type came from Matto Grosso collected by Rondon. Bailey writes me that "the Matto Grosso material all came from the northern and western sections of the state, and the snake material has a large number of Amazonian elements in it. I think most of it came from the Serra de Parecis or along what is now Rio Roosevelt."

INCERTAE SEDIS

"Siphonops syntremus" Cope

1866. *Siphonops syntremus* Cope, Proc. Acad. Nat. Sci. Philadelphia, p. 129.
1879.? *Typhlonectes syntremus* Peters, Mon. Ak. Berlin, p. 942.
1885.? *Dermophis syntremus* Cope, Proc. Amer. Phil. Soc. **22**, p. 171.

As Cope is the only herpetologist known to have examined the unique type of his *Siphonops syntremus*, I quote his remarks:

"A collection . . . . . from Belize from Dr. Parsons." "The same correspondent sends from the neighboring region of Honduras . . . . . *Ninia collaris* . . . . . and *Rhegnops visoninus*." "*Siphonops syntremus* sp. nov. This species differs from the four hitherto known [*Siphonops annulatus, Siphonops brasiliensis, Chthonerpeton indistinctum, Synopis mexicanus*, all considered as Siphonops in 1866] in the close approximation of the narial and tentacular openings; the latter lie a little behind the former, and are slightly larger. The minute eyes are just visible; the internal nares are some distance behind the palatine arch.

Muzzle projecting, obtuse in profile; from above narrowed, rounded. Teeth large, five on each ramus mandibuli. A gular, and strong postgular fold; 130 annular plicae, which are complete, except some slight ventral interruption anteriorly; the posterior third of the length with intermediate annuli, which are at first lateral only, then complete above, entirely complete on the terminal inch; the whole number will then be about 170 annuli. Form of body rather slender; tail depressed at end, short, acuminate. Color dark plumbeous, annuli yellow lined; head yellowish brown. This species resembles the *Caecilia ochrocephala* [described in the same paper], but is primarily distinguished by the position of the foramen, and of the inner nares, also by the color and character of the annuli."

Under *Dermophus syntremis*, in 1885, Cope says "I refer this species here provisionally only, as I have not been able to find the type specimen. Belize."

If it were not for this second statement the arrangement of the species in the original paper would tend to give the impression that the provenance of *syntremus* was "the neighboring region of Honduras."

If the description was accurate *syntremus* belongs to none of the species (or, indeed, none of the genera) listed in this paper. No other American form has the combination of the tentacle position of Typhlonectes or Chthonerpeton, with the primaries (130) and secondaries (40) of a Gymnopis or a Caecilia, the teeth of a Caecilia, and the "short, acuminate" tail of a Rhinatrema. As described, the species demands a new genus for its reception.

We have no right to assume that the description was inaccurate. *Caecilia ochrocephala* was described in the same paper, the type is extant, and the description is very accurate.

If the description was inaccurate, it is possible that it dealt with a specimen of *Gymnopis oligozona* (primaries 130–135, secondaries 62–74) from the same general area. *G. oligozona* was described from a specimen without data, by Cope, in 1877, and it is barely possible that the type of *oligozona* was previously the type of *syntremus*.

The National Museum (which contains the Parsons collection) has a specimen of *Typhlonectes compressicauda natans* labelled "Belize." This might, as a remote possibility, have been the type of *syntremus*.

No measurements were given for *syntremus*.

I cannot place this species in any genus known to me. I do not wish to name a new genus on the basis of a single unexamined specimen. I therefore merely set down the pertinent facts and refrain from any action.